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Trends

Crude-Oil Production
By States — Page 94

CRUDE-OIL STOCKS 237,511,000 bbl. as of Feb. 19—down 695,000. One year ago 234,562,000 bbl.

GASOLINE STOCKS 83,931,000 bbl. as of Feb. 19—up 1,609,000 bbl. One year ago 91,823,000 bbl.

RESIDUAL FUEL-OIL STOCKS 52,965,000 bbl. as of Feb. 19—up 512,000. One year ago 70,371,000.

GAS OIL AND DISTILLATE 33,709,000 as of Feb. 19—down 1,145,000. One year ago 36,122,000.

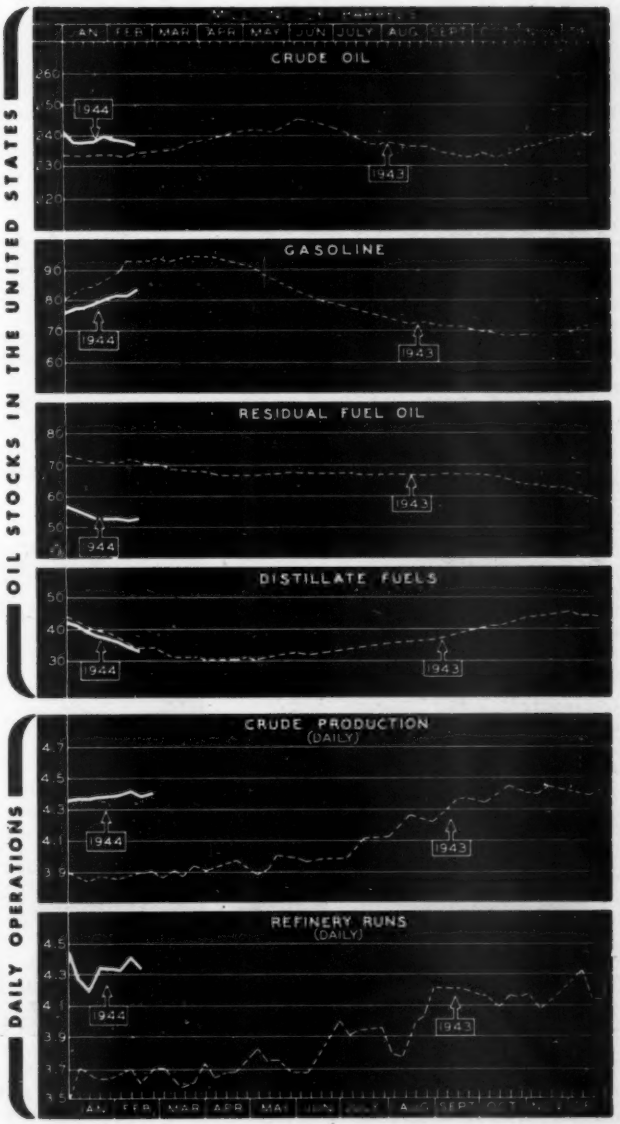
CRUDE-OIL PRODUCTION* 4,429,215 bbl. daily average—up 31,780 bbl. One year ago 3,860,075.

REFINERY RUNS 4,340,000 bbl. daily week ended Feb. 19—down 88,000 bbl. One year ago 3,668,000.
*Last week, 4,397,435.

THE petroleum industry in the United States had before it on Tuesday the results of two months operations. It had established a record in crude-oil production of 4,395,000 bbl. daily up to February 26, an increase of 536,000 bbl. daily or 14 per cent over the corresponding period of 1943. The average daily production so far this year was 30,000 bbl. under the recommended daily output of PAW. In refining the 1944 expansion was even more impressive, with crude runs to stills for the 8 weeks up to February 19 averaging 4,317,000 bbl. daily, 694,000 bbl., or nearly 20 per cent, greater than during the same period in 1943. Drilling operations, on which the expanded production and plant operations depend, were less than the projected schedules of the Government. The petroleum industry in this country has been asked to drill 5,400 wells the first quarter of this year. Assuming an equal daily division of this quota throughout the quarter, domestic operators should have drilled 3,360 wells up to February 26. The actual number reported was 2,818, or 16 per cent less than the quota. Completions have shown a sharp upturn and the recent rate in drilling has been in line with projected operations for the quarter.

AT the end of one-sixth of the year's operations additional expansion in practically all phases of activities was assured. Lack of transportation facilities for both crude oil and refinery products and delays in new refinery construction have been factors in operations so far this year and will continue to be. While March crude-oil output will be about the same as in February crude runs to stills should increase.

IN Texas which accounts for a large part of the expansion in oil operations some crude oil has been run to storage due to the postponement in completing new refining facilities which were expected to be in operation early this year. Tardiness in getting the 20-in. line from the Texas Gulf Coast to the Atlantic Seaboard into operation has been reflected in plant and field work. March is expected to see the end of many of these difficulties, with resultant balancing of operations, which include substantial expansion in the production and transportation of war products. How to make more refinable crude oil from District 3 available in District 2 and parts of District 1 is still a problem for which complete answers have not been found.



Operators to Receive Preview of OPA's Stripper-Well Subsidy Proposal

by Henry D. Ralph

WASHINGTON, D. C.—A plan for subsidizing production of oil from stripper and marginal-cost wells has been outlined by the Office of Price Administration to representatives of producers, and suggestions from the industry will be awaited before the plan is submitted to the Office of Economic Stabilization.

The proposal will be discussed at a meeting in the Jefferson Hotel, St. Louis, Mo., March 9 and 10, called by the Independent Petroleum Association of America and the National Stripper Well Association.

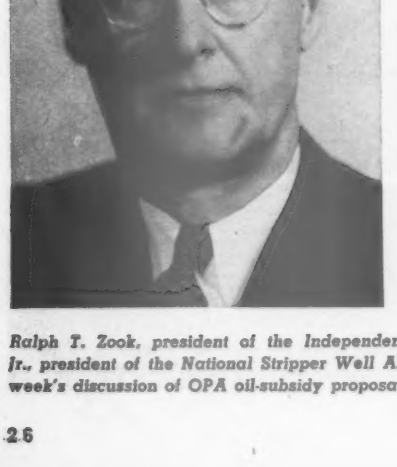
Both OPA and industry representatives are reluctant to discuss details of the proposal, explaining that it is still in a formative state and has not yet crystallized, but in general it is a plan to permit refiners and crude-oil purchasing companies to pay a premium price for oil from stripper wells and be reimbursed by the Government for the amount of this premium.

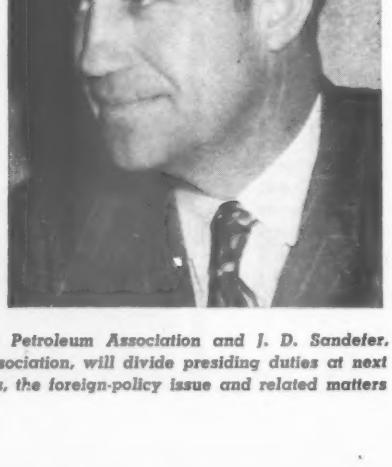
Officials of the two associations declared that the proposal is more concrete and workable than any suggestions so far emanating from government agencies, and that it may be possible to develop it into a plan which would win rather general approval if all hope is abandoned for a general increase in the crude-oil ceiling price.

OPA officials confidently expect the industry to reply with concrete and constructive suggestions for working out details of the subsidy scheme. This will be attempted at the St. Louis meeting, although the industry has by no means abandoned its fight to force a higher general crude-oil price. The meeting will discuss the legislative situation confronting the Disney bill to require a higher crude price which has been passed by the House and is now awaiting hearings before the Senate committee on banking and currency. Formation of a national foreign-oil policy also will be considered at the St. Louis meeting.

Issues to Be Clarified

A committee of representative oil producers, appointed by I.P.A.A., will meet in St. Louis March 7 to consider all phases of incentive plans for increasing oil production, including the OPA stripper-well proposal and suggestions from various other sources. This committee is expected to make a report which will serve as the basis for discussion by the general meeting.





Ralph T. Zook, president of the Independent Petroleum Association and J. D. Sandefer, Jr., president of the National Stripper Well Association, will divide presiding duties at next week's discussion of OPA oil-subsidy proposals, the foreign-policy issue and related matters

The present OPA plan applies only to stripper wells. Other proposals are under discussion to provide incentives for new discovery and for secondary recovery, but OPA feels that these are separate problems and that stripper wells should be taken care of first. Reasons for this include the fact that about half the producing wells in the country would fall into the stripper-well category, stripper wells constitute the area of the producing industry closest to the distress line, and the investment is already in place.

Possibly another reason, though this was not mentioned by OPA officials, is that a higher price for crude from stripper wells might remove the greatest bulk of political pressure for action to force a general increase in crude-price ceilings.

OPA hopes to avoid the troublesome and apparently insoluble difficulty of writing a satisfactory definition of a stripper well by applying the subsidy to entire fields rather than to individual wells. In general the intention is to apply the subsidy to pools where the average lifting cost is less than the return from the sale of oil and yet to avoid any attempt to obtain detailed cost estimates on individual wells. OPA officials admit that it would be an administrative impossibility, and involve a huge accounting task, to attempt to deal with individual wells.

A more or less arbitrary definition will be made, subject to exceptions to make it administratively flexible, whereby fields or entire areas will be eligible for the subsidy payment. If some wells in these areas are producing at a profit or are not strictly stripper wells, their oil will not be segregated or excluded from the subsidy. On the other hand, small or high-cost wells in a generally profitable field will not be eligible for the benefits under the plan.

The number of barrels produced per well per day probably will not be the determining factor, as other elements of cost will be considered. For example, a field producing considerable oil per well but also producing large quantities of water which is costly to lift might be eligible for the subsidy.

While many thousands of wells

might be classified as strippers, there are probably less than 2,000 producing fields and an even fewer number of crude-oil purchasers. It will therefore be a much easier administrative task to deal with entire fields and with individual buyers rather than with individual wells.

The plan calls for authorizing buyers to pay higher than the posted prices, or present OPA ceiling prices, for crude from designated fields. This premium might be uniform throughout the country or might vary from field to field as determined by OPA. The purchasers would then bill some federal agency, probably the Defense Supplies Corp., for the amount of this premium on all such oil purchased, and would not be allowed to increase their selling prices for crude or products.

A somewhat similar plan is now employed in the copper subsidy, for while theoretically the Government purchases copper for war uses from marginal mines at higher than the prevailing price, in actual operation the smelters simply pay the premium and bill the DSC for reimbursement for the difference.

OPA proposes to submit to the Office of Economic Stabilization only a generalized program, anticipating that the OES will work out the details in cooperation with the Reconstruction Finance Corp. or whatever agency will pay the subsidy. OPA itself has no funds for paying such subsidies. Whether or not additional legislation or appropriations would be required to put this plan into effect is a question to be decided by OES.

The OPA proposal probably will be laid before the Senate banking and currency committee as an alternative to the Disney bill for a general crude-price increase, but unless there is pressure by Congress, OES, or other source for speedy action, OPA intends to await the reaction and suggestions of the oil-producing industry before formally endorsing any plan of this nature.

PIWC Members Level Sharp Criticism at PRC Program

NEW YORK.—Strong opposition to the proposed agreement between Petroleum Reserves Corp. and three American oil companies for the construction of a Persian Gulf-Mediterranean pipe line was voiced by members of the policy committee of the PIWC at the council's March meeting. Opinions of oil men whose companies are not directly concerned are apparently unanimously opposed and, since a function of the PIWC is to reflect industry opinion, the council is expected to take a definite stand against consummation of the contract.

There is a variety of bases given for this opposition. Possibly the foremost is that it would put the Government in the oil business, an eventuality against which the industry has long protested. It is contended that, by building and owning the line, the Government would be very definitely in the oil business and would, at the same time, be in position to exercise a strong measure of control over production in what looms as one of the world's richest producing areas.

Not only would the Government become an operating factor in the industry through this step but it would do so in a manner completely at odds with industry principles. The first sentence of Section 9 of the agreement states, "Companies will not construct . . . any additional . . . pipe lines . . ." The effect of this part of the agreement would be to give the Government a monopoly over the westward movement of crude oil by pipe line from Saudi Arabia and Kuwait. This control would be permanent and monopolistic.

Interpretation on Control

Another part of the agreement to which objections have been raised is the third paragraph of Section 8 which states, "The commercial and other policies and practices of the companies would conform to the foreign policy of the United States." Since this would cover all phases of company operations, it appears that the State Department would have control over all such operations. In the past, notably in case of oil shipments to Japan before the embargo, oil companies kept the State Department fully informed of foreign activities. Since the companies have cooperated with the department in the past and could hardly do otherwise in the future, this switch from cooperation to compulsion seems wholly unnecessary—unless the hitherto passive interest of the State Department is to become active regulation.

Another opinion which is widely held is that the undertaking is a potential threat to world-wide oil economy. Concern on this score is particularly evident among domestic producing companies conducting higher-cost operations.

They fear if a large capacity line is built to serve Saudi Arabia, similar lines will be demanded by the governments of Iraq and Iran. Iraq has an eastern Mediterranean outlet capable of handling 80,000 bbl. a day, well below the country's potential. Oil from Iran must move around Saudi Arabia and through the Suez Canal to reach the Mediterranean, a long and expensive route, with Suez Canal tolls of 13 cents per barrel.

British Proposal

British interests have proposed a 200,000-bbl.-per-day line from Iran and a 150,000-bbl. line to supplement the existing Iraq line. These lines with the present Iraq line and Egyptian production would make 750,000 bbl. a day available in the eastern Mediterranean, virtually all of which, presumably, would be for the western European market. In addition, Europe, west of self-sufficient Russia, has production of around 150,000 bbl. a day, so that 900,000 bbl. daily would be available for consumption there. In 1939, all of western Europe consumed about 800,000 bbl. a day of natural and synthetic-oil products. Therefore, this volume of oil would be more than sufficient for the market it would be expected to supply. Because of this volume and its low cost (it has been estimated that Middle East oil could be laid down at Alexandria or Haifa by pipe line at 50 to 60 cents per barrel) this would exclude other oil from Europe.

Such a development would be a severe blow to Latin America which has supplied a large proportion of European demand in the past. For example the United Kingdom, in the last prewar year, obtained 50 per cent of its crude from Latin America. France obtained 20 per cent of her crude and 50 per cent of her fuel oil from that source and Germany, third of the important western European consuming nations, obtained 50 per cent of her crude imports from South America.

As a consequence Latin American oil would necessarily seek another market. Inability to do otherwise would be a severe economic blow to such countries as Venezuela, Colombia, Mexico, and Trinidad whose economy is built substantially around oil. With U. S. government impetus, American oil companies operating in Venezuela are undertaking a development program there which will add substantially to that country's potential. This involves drilling, pipe-line construction and, after the war, refinery expansion. The objective is a production rate of 1,000,000 bbl. a day.

Normally Europe might be expected to take a quarter to a third

of this oil after the war but if that market is already glutted with Middle Eastern oil there would be only one other market to absorb it—the United States. It is not inconceivable that this volume, plus that which would come from other Latin American countries, would have a seriously adverse effect on domestic crude prices.

If pipe-line deliveries to the eastern Mediterranean exceeded requirements, the surplus would also be available to U. S. markets. It has been estimated that such oil could be shipped to this country at a cost of 55 cents per barrel so that its delivered cost here might be as attractive as or more attractive than crude transported from the Gulf coast.

Another political effect which has been cited is that a concentration of cheap oil in the eastern Mediterranean might well destroy the established practice of basing world prices on the U. S. Gulf market. There is no objection to the elimination of the Gulf as a base point, established as such due to its rank as the world's foremost petroleum shipping point. The objection is that a sudden upsetting of the established system would disrupt world-oil economy with the most adverse effects being felt by the highest cost producing areas which would include this country.

Need Not Critical

It is believed that if this developed gradually, the evolution would be accomplished with no disruptive effect. Gradual evolution would result if the companies pursued normal development of the Middle East. Actually there is no critical, immediate need for the pipe line. It would be impossible to complete it before mid-1946, long after the European war is expected to be finished. This would rule out its value as a war measure and give it only peacetime significance. Since it is certain that this country will have a surplus of tankers in the immediate postwar era, there will be ample transportation for Middle Eastern oil so that construction of the line could be delayed until it was thoroughly justified economically.

Construction of a Persian Gulf-Mediterranean line eventually would be an economic move, particularly as long as the high Suez canal rates remain in effect. It could be financed solely by the companies and would probably be undertaken by them when production and demand warranted.

Earmarking of some of the Saudi Arabian oil as a military reserve is regarded as of questionable soundness. It is pointed out that every major country in the world is closer to the Middle East than is the United States, that its defense in time of war might well be impossible and that it would be difficult if not impossible to maintain necessarily uninterrupted transportation of oil over so great a distance in wartime. This objection is accomplished by the contention that development of a more accessible reserve would be a wiser expenditure of American money. The extensive naval reserve in Alaska, which is highly regarded as prospective oil producing territory but which has never been drilled, is cited as an alternative.

In view of the objectionable features of the agreement some oil men wonder if pressure was brought to bear on the companies involved. They see the possibility that the companies were threatened with a loss of their immensely valuable concessions and that acquiescence in the pipe-line agreement afforded them their only alternative. If so this would be in contrast to conditions as they once existed in the Middle East. The Saudi Arabian concessions were sought by other countries, including the Axis powers, but American oil companies, without the aid of their government, were successful in obtaining them. This proved the aptitude of American oil men for international diplomacy.

A summary of these objections indicates that those holding them fear a flooding of the world oil market as a readily possible result of the proposal. These men, with East Texas of the early '30's still fresh in mind, hope that gradual development which, in the long run, would be best for the Middle East as well as other producing countries, will be allowed.

Industry Allocated 558,520 Tons Of Steel During Second Quarter

WASHINGTON, D. C. — Supply and demand for drill pipe, generally speaking, are in balance. The amount of steel allocated for oil-country tubular goods in the second quarter, plus export and military orders, represents the full capacity of mills manufacturing such products. These statements were made here this week by Frank A. Watts, director of materials, Petroleum Administration for War, reporting to PAW's production committee February 29.

Disclosing the War Production Board allotment of controlled materials to PAW for the second quarter, Watts said:

"Allotments of 465,000 tons of carbon steel, 93,520 tons of alloy steel, and proportionate amounts of copper and aluminum were made to PAW. Of the 465,000 tons of carbon steel, it is estimated that 80,815 tons will be required for refining, transportation, natural-gasoline plants, and other construction; 280,000 tons for production operations; 68,685 tons by the petroleum-equipment manufacturers; and 35,500 tons for the maintenance and repair requirements of production, transportation, natural gasoline, refining, and marketing operations.

"Of the 93,520 tons of alloy steel, it is estimated that 1,020 tons will be required for construction operations; 52,000 tons for production operations (including N-80 casing and tubing); 35,000 tons by the petroleum-equipment manufacturers; and 5,500 tons for maintenance and repair requirements.

"The largest single item both of carbon steel and alloy steel is oil-country tubular goods. Of the 332,000 tons of carbon and alloy steel (280,000 carbon plus 52,000 alloy) for allotment for production operations, 262,000 tons will become casing, tubing, and drill pipe. The difference will become line pipe, wire rope, structural steel, and relatively small quantities of other forms and shapes required for production operations."

Tool Joints Removed From Preference Rating Control

WASHINGTON, D. C.—Production operators no longer need obtain preference ratings for tool-joint purchases under terms of a revision in PRO P-98-b. Future procedure will be similar to that now used in procuring rotary bits.

Tool-joint manufacturers are faced with a 10-month backlog of orders. Current production is sufficient to fill the more urgent requirements and by removing preference rating restrictions on tools joints, PAW may divert the supply to the more urgent needs. Distribution of available tool joints will be under the direction of PAW. Thus, operators with inferior preference ratings but in urgent need of tool joints may, assuming conditions warrant, receive delivery ahead of less critical demands.

Ralph K. Davies, deputy petroleum administrator, said that the change in preference control of tool joints would aid materially in bringing the rate of completions up to the levels projected by the PAW Production Division.

THIS WEEK

PRICES—Drive launched to pacify general price-advance advocates with subsidy. . . . OPA has one, probably several, trial balloons, for industry inspection. . . . ¶Action may inspire counter proposals from industry which is part of OPA strategy. . . . Some stripper operators ready to capitulate, wearied of holding out for general advance. . . . ¶Details of OPA suggestions circulated among selected group. . . . Conviction continues, nevertheless, that it's industry-wide problem, deserves unfettered discussion by all elements. . . . ¶Program calls for extension of first financial relief to stripper operators, a numerical majority and most vociferous element. . . . Incentives to stimulate exploration will follow later, says Washington grapevine, but when and, in what form cloaked in vagueness. . . .

PRODUCTION—PAW quota for Texas, in March, modified, to correlate with buyers' demands, transportation outlets. . . . ¶California's allowable revised upward, by liberalization of maximum efficient rate of withdrawals. . . . Pacific Coast production rising, peak definitely limited, may be intenible for prolonged period. . . . ¶Increase of 18,000 to 25,000 bbl. daily in Illinois predicted by state commissioner, when PAW spacing restrictions are relaxed. . . . Four wells per 40 acres to base of Aux Vases and two wells per quarter-quarter section in lime will be authorized, double current limitation. . . .

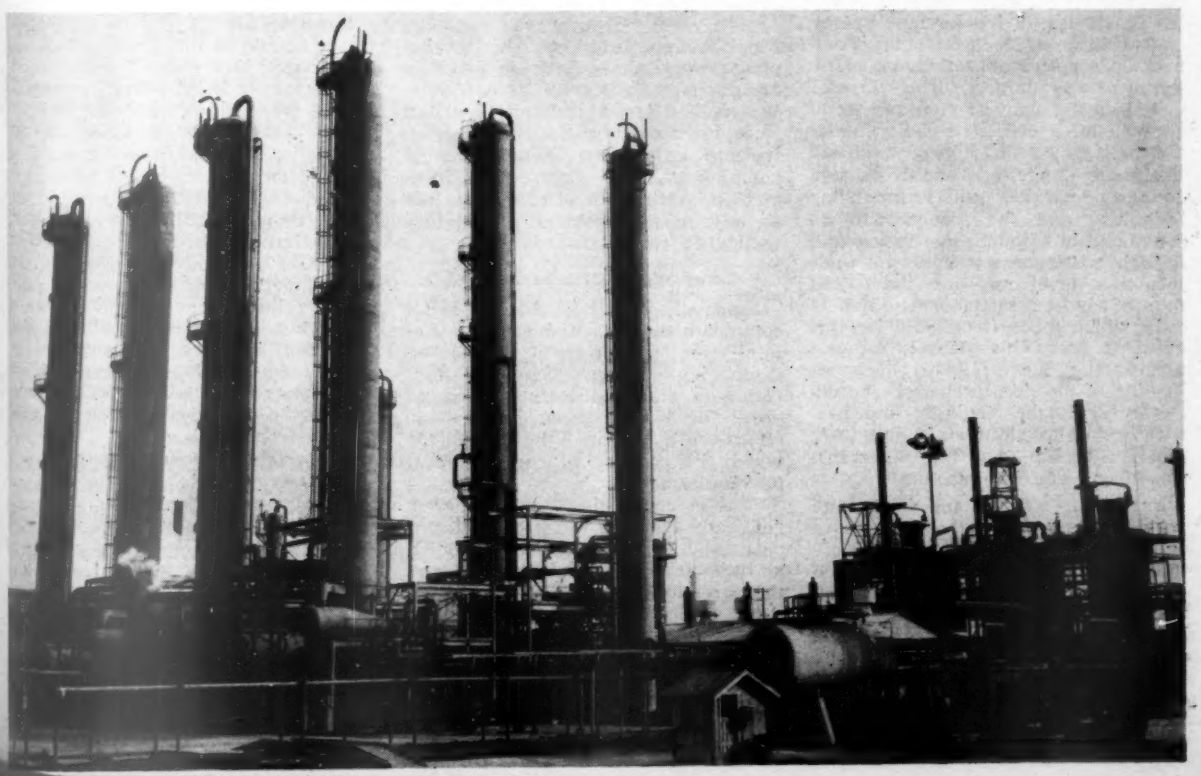
REFINING—Tardy completion of war plants on Gulf Coast holding crude runs below anticipated levels. . . . Stocks of all light products there at near-minimum levels. . . . ¶Draft on butylenes by synthetic-rubber plants declared inconsequential, relatively minor factor in total production of this fraction. . . . ¶Skilled workers transferred without delay from completed aviation-gasoline units to jobs where construction is lagging. . . .

MATERIALS—Industry allocated 558,820 tons of steel for second quarter operations, 465,000 carbon and 93,520 alloy. . . . ¶Production operations assigned 280,000 tons, including drilling equipment. . . . ¶Oil-country tubular goods largest single item—280,000 tons of carbon and 52,000 of alloy steel. . . .

SUPPLIES—First deliveries through WEP 20-in. products line reach East Coast, easing inventory outlook. . . . ¶Kerosene and light fuel-oil deliveries from District 2 still take precedent over gasoline movement to East Coast. . . . ¶Calls rising sharply for motor fuel in agricultural districts. . . . ¶Six government agencies assigned preferential position in deliveries of residual fuel oils, to assure full satisfaction of demand at coastal terminals. . . .

TRANSPORTATION—War Department and PAW refuse confirmation and disclaim knowledge of trans-Mexico pipe line, across Isthmus of Tehuantepec. . . . ¶Inclement weather curtails tank-car movement of East Coast, causes congestion at rail centers. . . .

First picture authorized for publication of the eight-column feed-prefractionation and solvent-extraction units in the toluene plant of Shell Oil Co., Inc., Wilmington, Calif.



Seated in the front row on the speaker's platform were: C. B. Watson, vice president of Pure Oil Co.; W. F. Burt, a director and chairman of the manufacturing committee, Socony-Vacuum Oil Co., Inc.; M. Halpern, vice president of The Texas Co., all directors of Neches Butane Products Co.; Herbert Henderson, vice president of Gulf Oil Corp., and chairman of the Neches company; R. H. Colley, president of Atlantic Refining Co.; Rev. Gresham Marmion and Stanley T. Crossland, vice president, Rubber Reserve Corp., RFC subsidiary

W. H. Hoffman, president, Neches Butane Products Co., official host at last week's dedicatory ceremonies

Industry Praised for Turn On Priorities

by Arch L. Foster

Engineering and operating data on the Neches Butane Products Co. plant are described in a companion story, starting on page 43 in this issue. Liberalization of censorship permits disclosure of many technical aspects heretofore withheld from publication for reasons of security.

PORT NECHES, Tex.—High tribute was paid here February 23 to workmen and contributing refining companies by Rubber Director Bradley E. Dewey in his keynote speech of dedication of Neches Butane Products Co.'s petroleum-butadiene plant, the world'es largest. The director eulogized the army of men and women who have worked steadily under the most severe handicaps to bring the plant along until one of its two equal and parallel units is producing butadiene and the second will be completed in a short time. It was and is their willingness to carry on their jobs on a level over and above that required by a reasonable devotion to duty which made it possible for this group to carry this plant to completion as they have, Dewey declared. Tossing aside his prepared speech, Dewey spoke hearteningly and personally to the plant staff and their reaction to him and his statements was strong and spontaneous.

Explaining some of the delays and postponements which have confused and perplexed both the builders and the general public, it was pointed out that "somebody had to be first and somebody had to wait," so that Rubber Reserve Corp. threw the greater part of the material needed for butadiene units to the alcohol plants while the petroleum facilities had to be content with lower priorities and delayed completion dates. It is for these reasons that the petroleum units have been slower in completing their construction work and in getting on stream, and not to any mismanagement or dilatory tactics, it was stated.

Companies' Attitude Lauded

Especially did the rubber director commend the unselfishness, magnanimity and patriotism of the five oil companies who have combined their resources, staffs and refineries to operate the Neches plant, to produce one-seventh of all the butadiene which this country will need to meet its requirements.

"These companies," he declared, "have always been the strongest competitors. After this war is won they'll go back to the private enterprise and the strenuous competition which is the American way; in fact, it is to protect that way and perpetuate it that these companies are uniting in this common enterprise, so that way may be held safe and operative."

These companies are managing and operating this huge unit without recompense or fees for operation or management of the company, supplying also from their highly experienced staffs and directing and supervisory personnel for the organization.

Brown Explains Delay

Representing Petroleum Administrator Harold L. Ickes, who could not be present, Bruce K. Brown, assistant deputy administrator, presented to the Neches company the compliments and thanks of Ickes on the completion of this greatest part of their construction job. Brown expanded on the difficulties faced by PAW, then OPC, immediately after Pearl Harbor. Throwing the greater weight of equipment at first to the alcohol methods for butadiene because of the relatively very large amounts of alcohol immediately available, the petroleum industry has made every possible haste with the material at its command and is now adding rapidly to the growing stockpile of rubber and intermediates.

Brown disclosed that the five refining companies contributing charging stock to the Neches Butane Products plant will deliver about 4,500 bbl. of butylene a day but that this volume is less than 1 per cent of the total daily output of refined petroleum products at the five participating refineries.

"It should be noted for the record,"

On the other side of the platform sat: Sidney Latham, secretary of state for Texas; Bruce K. Brown, special assistant deputy petroleum administrator; Dr. E. R. Gilliland, assistant rubber director, and W. E. O'Brien, assistant to the director; and F. P. Dodge, assistant to the vice president in charge of refining for The Texas Co., master of ceremonies and chairman of the arrangements committee; W. A. Slater, vice president of Gulf Oil Corp.; J. B. Rather, manager of research and development for Socony-Vacuum Oil Co., Inc.; J. P. Langfitt, assistant to vice president in charge of refining for Pure Oil Co., and G. R. Bryant, general manager of the refining department for The Texas Co., all directors of the Neches company

Patience in Waiting for Butadiene Plants

Brown said, "that even with the vast new equipment investments and operating costs necessarily incurred, the contract prices for butylene which you (the five participating refining companies) supply to the Neches plant are only a fraction of a cent a pound more, or a few pennies more per gallon, than the current wholesale price of premium-motor gasoline at refineries in this area.

Butylene Production Program

"It must be borne in mind by those who have feared shortage of butylene for the rubber program," Brown continued, "that for every refinery making 100-octane gasoline in the United States which is called upon to make any butylene contribution for butadiene production, there will be five other 100-octane producers whose butylenes are not needed at all in the rubber program as well as a host of other refineries which are supplying butylenes,, either as such or as codimer which flow into the 100-octane program."

Efficiency of the petroleum-butadiene process operating on butylene charging stock was cited by Brown although he made no direct comparison with performance of alcohol plants which, at the current stage of development, have captured most of the commendation for exceeding rated capacities. He said that one of the butylene-butadiene units at Baton Rouge, La., which was accorded super priorities along with alcohol units has been "ticking along merrily at an over-capacity rate for a good many months."

Many people, Brown said, were intrigued to learn that butylene was present in all prewar cracked gasoline, although when used in conjunction with other petroleum hydrocarbons in the motor-fuel range it did not need to be separated out of mixture. The principal aim in the life of refinery technologists and the PAW Refining Division for the past 2 years he said, has been to dig butylene out of gasoline in order to use it for the production of war materials. All of the butylenes in prewar gasoline, however, were insufficient and therefore it was necessary to build catalytic crackers to produce more. Also, elaborate distillation equipment had to be built to separate the desired butylene from its petroleum cousins, he said, in giving a broad explanation of the basic requirements behind the

PERTINENT STATISTICS

Plant area: 314 acres. Number of fractionating towers, 48. Size of fractionating towers: highest 175 ft. by 14 ft., about height of 17-story building. Number of pressure spheres: 42; largest group in history of oil refining; pressure required to store butadiene and raw stock, 75 lb. steam generating capacity, 50,000,000 lb. per day, 60,000 boiler horsepower. Fuel required: Natural gas, 78,000,000 cu. ft. a day; equivalent coal, 2,400 tons a day, about 43 freight carloads. Cooling water capacity, 308,000,000 gal. a day, enough to supply water demands of a city the size of Cleveland, Ohio. Feed stock required from five contributing refineries, 18,000 bbl. of butane-butylene a day. Plant capacity, 100,000 short tons of butadiene per year, enough to make 110,000 long tons of synthetic rubber a year, or about one-seventh of all called for in the 800,000-ton government program. Number of employes needed to build plant: about 6,000; number of employes needed to operate plant, about 700.

Rubber Director Bradley Dewey praises oil executives and workmen at the dedication ceremonies at the Neches Butane Products Co. at Port Neches for their part in completing the plant

$1,250,000,000 refinery construction program directly related to 100-octane gasoline and synthetic rubber.

The dedication ceremony was directed by Fred P. Dodge, veteran technologist of The Texas Co. at nearby Port Arthur, Tex., and dean of local refiners. Stanley Crossland, vice president, represented Rubber Reserve. Herbert Henderson, vice president of Gulf Oil Corp., and chairman of the board of Neches Butane Products Co.; W. H. Hoffman, president of the Neches company; Carl Reed, president of the Lummus Co., engineers and contractors on the plant; Harry Wiess, president of Humble Oil & Refining Co., and many others were present.

After the dedication a reception was held by the leaders present at Port Arthur, and dinner was served to 500 or more of the visitors. Henderson acted as master of ceremonies and introduced many of the guests.

States Promised Relaxation of Control Over Well Spacing

WASHINGTON, D. C.—A decrease of 53,000 bbl. per day in the certification of desired crude-oil production in Texas during March has been made by the Petroleum Administration for War, following representations made by the Oil States Regulatory Conference here February 25 and 26.

Col. Ernest O. Thompson of the Texas Railroad Commission reported to PAW that while Texas could produce considerably more crude than the amount certified for March, purchasers and refiners are unable to handle such a quantity at present, and pipe-line proration is threatened. Rather than have crude accumulate he asked that the production rate be reduced to the amount which can be taken by purchasers.

The quarterly meeting of the state petroleum regulatory officials discussed with PAW at considerable length the subject of well spacing and drilling restrictions, and Thompson, chairman of the body, declared that the discussion was very helpful and that a general agreement was reached for gradual relaxation of PAW drilling regulations. Several of the state officials requested that PAW lift all drilling restrictions and return this function to the states wherever a state has an adequate conservation law and regulatory body. They argued that the only reason for federal control was to conserve steel and other drilling materials, and now that more steel is available for the oil industry there is no need for a uniform spacing regulation. They pointed out that steel has been promised to drill 24,000 wells this year, and contended that unless the uniform spacing restriction is lifted and the states are given back the power to control drilling it may be impossible to secure the drilling of this number of wells.

PAW officials objected to complete lifting of their restrictions, but promised to relax them gradually as fast as is possible under the materials supply situation, and that eventually all federal control of drilling will cease.

Robert M. Medill, director of the Illinois State Department of Mines, declared at Springfield that PAW officials had agreed to relax spacing restrictions on Illinois wells, effective March 15. Four sand wells per 40-acre tract, instead of two, will be permitted to be drilled to the base of the Aux Vases, regardless of depth, and two lime wells may be drilled to the base of the McClosky on each quarter-quarter section instead of one under existing regulations, according to Medill.

"This relaxation should result in hundreds of sand wells being drilled or deepened to the Aux Vases below 2,500 ft., and many lime wells deepened or drilled to the McClosky lime," Medill said. "It should result in a large increase of daily production as most tests will be on proved locations."

War Department Refuses Comment and PAW Denies Knowledge of Mexico Line

WASHINGTON, D. C. — The War Department this week refused all comment on published reports that the Army plans to construct a large new pipe line across the Isthmus of Tehuantepec in Mexico.

Likewise, officials of the Petroleum Administration for War disclaimed all knowledge of the project but pointed out that some of the published reports appeared impractical. One report was that a double line would be built and that it would have daily capacity of 500,000 bbl. of crude oil. Most of the oil, the unconfirmable reports concluded, would be supplied from Texas by tanker, and that a Texas refinery would be dismantled and moved to Salina Cruz on the Pacific Coast of Mexico. One source said that Petroleum Reserves Corp. was behind the trans-Mexico pipe line.

Another report which was equally unsupported by official comment at PAW offices was that an international pipe line would be constructed from South Texas to Mexico City to augment the supply of crude available for a United States financed aviation-gasoline plant.

Meanwhile, details were virtually consummated in the contract for construction of 100-octane refinery facilities in Mexico City. Funds for the project, it is understood here, will be provided through the Export-Import Bank. The letter of intent covering negotiations up to this point is to be supplanted with a formal contract which was to have been executed here this week by representatives of the two governments.

Sohio Petroleum Has Two New Production Divisions

Two new production divisions have been created by Sohio Petroleum Co., subsidiary of Standard Oil Co. of Ohio, to handle a campaign of expansion in the middle western and southwestern areas. W. T. Holliday, head of Sohio, said one, designated as the Oklahoma City division, would be under the direction of Frank Willibrant, now superintendent for the company in Oklahoma. Its headquarters will be in Oklahoma City, and it will embrace Oklahoma, Kansas, and all of Texas except the East Texas district.

The other, designated as the Shreveport division, with headquarters in Shreveport, La., will be under the direction of C. J. Haas. It will embrace East Texas, Louisiana, Mississippi, Arkansas, and Illinois.

Atlantic to Drill Exploratory Oil Wells in Venezuela

NEW YORK. — Drilling rights on concessions in Venezuela have been acquired by Atlantic Refining Co. through an agreement entered into with Pantepec Oil Co. of Venezuela, C.A. Atlantic is to drill at least eight wells at its own expense before March 31, 1947. At least two are to be completed within 1 year from April 1, 1944, and at least four others within 2 years from the same date.

The agreement gives Atlantic the right at any time within 60 days after completion of the wells to acquire a 50 per cent interest in these concessions for $4,000,000. It also has the right to acquire at any time prior to April 1, 1945, a 50 per cent interest in the Pirital field for $2,000,000.

Standard of Louisiana and Shell Win Security Awards

WASHINGTON, D. C.—Two refineries, Standard Oil Co. of Louisiana, Baton Rouge, La., and Shell Oil Co., Inc., Norco, La., have received the Office of Civilian Defense National Security Award for superior achievement in plant security.

The award gives recognition to plants and facilities achieving outstanding programs of protection against sabotage, fire, explosion, air raids and similar hazards.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

A Realistic Oil Policy

A CONSUMER who says he is a "realist" wants a "definite" program in lieu of the government plans to become a partner of its nationals in the oil operations of the Middle East and other areas. He wants assurance that he and millions of others will have plenty of gasoline and other products in the postwar period.

This inquirer explains that he doesn't like the international complications of governmental participation in foreign oil operations, but he doubts that private operators, removed from governmental aids, have adequate substitute plans.

His attitude is typical, and the questions he raises must be answered frankly or he and other millions will succumb to the social and political philosophies of those who seek to make permanent and further extend the war controls of all our economic activities, with emphasis on petroleum.

In projecting the future to petroleum users no punches should be drawn. They must realize that they will have to pay for the war policies of a Government dominated by political considerations rather than by the needs of an industrial enterprise.

Any national oil program must include higher prices for crude oil and its products. Advances now, with an ending of all unjustified operating restrictions, would serve the war effort and ease the inevitable adjustments to follow.

In answer to this reader's question we don't know—nor does anyone—what increases in prices should be made effective in the rehabilitation period. In the case of crude oil they must be high enough to put to work every force of the petroleum industry in the finding and production of new oil. Drilling should be doubled if necessary and exploration of every type must be conducted on a much broader and intensive scale than ever before.

Under this program product prices would advance. Gasoline, however, would continue to be the cheapest of all major products. If consumers should decide they must have relief they can get it by forcing their political leadership to reduce state and federal excise taxes. A 50 per cent reduction in these levies would offset a 50-cent-per-barrel advance in the price of crude oil.

But suppose this did not find the required new oil in this country. This is a possible, but not a probable development. The additional incentives would still be worth all they cost. New recovery operations would bring to the surface additional crude oil in operations which cannot now be justified.

In refining, all the arts which operators have been able to use only in part would be utilized in gaining the maximum yields of petroleum's most essential products. If justified by market levels as manufacturers they can make three barrels of crude oil do what four are now doing.

Under this program the major duty of advancing the country's economy and assuring its security rests with domestic oil operations. Actually the additional oil will give impetus to oil operations everywhere. Our neighbors to the south will have new output available. The Eastern Hemisphere probably will become independent of the Western Hemisphere, releasing large supplies wherever they are needed.

There is nothing in this situation that should alarm our consumer friend. There are no problems here which can't be solved effectively by private operators, with full protection to all classes of consumers, once they are relieved of the restrictions and the actual and prospective competition of their own Government.

Asserted Increase in Number of New Discoveries Offset by Poor Quality

*by W. V. Howard**

This is the fourth and concluding discussion of trends in reserves and production, amplifying data published in the Journal's Annual Issue. Related discussions on excessive withdrawals from major fields, how this trend forecasts a crude-oil shortage and failure of wildcat drilling to meet discovery requirements of the nation appeared in issues of February 3, 10 and 17. This article deals with distortions of discovery results because of changes in definitions of the term.

IT is often claimed that the oil industry is making more discoveries than at any time in its history. The press has recently carried reports emanating from OPA to this effect and this statement has been considered a justification of the freezing of prices at present levels, or at least a reason for rejecting the argument that higher prices would stimulate discoveries.

Obviously, an increase in the number of discoveries does not mean that there is an increase in the quantity of new oil found if the average size of the discoveries is diminishing. In order to establish a trend, it is necessary to determine:

1. The number of discoveries.
2. The average size of recent discoveries.
3. The presence or absence of major discoveries in recent years.

In a recent issue of the Journal, it was shown that there is good evidence that the reported increase in wildcatting activity was due to a liberalization of the term "wildcat" and not to an actual increase in exploratory drilling. Naturally, a discovery results from a successful wildcat completion so that if the number of wildcats reported increases, the number of discoveries reported will also increase.

The number of reported discoveries, however, has little significance unless it is broken down to separate what might be called discoveries made by production departments on the one hand and by exploration departments on the other. It is not customary for a producing area to be abandoned until it has been thoroughly tested, not only laterally, but also to depths limited only by the ability to drill or by the penetration of the last possible pay. Reserves added in this way add to the immediately available production, but so does the substitution of close spacing for wide spacing. Wells tapping these reserves are more accurately described as semi-development wells than as wildcats.

*Consulting Geologist, Tulsa.

Many Discoveries Fade Early

After these discoveries of extensions and new pays are deducted from the number of discoveries reported, there remains a large number which do not result in the development of fields which are reported in production records. This is due to two principal causes. Either the discovery peters out or it is found to be actually an extension even though it was originally considered a new field. Thus, the number of new fields announced by the various reporting bodies is almost invariably larger than the number of new fields reported by organizations maintaining production records. In many cases, the new field does not disappear by reason of merger for several years.

For example, in Illinois and Indiana, discoveries were announced in 1939 at Griffin, Keensburg, Calvin and New Harmony in Illinois, and Griffin and Ribeyre Island in Indiana. To these were added North New Harmony in 1940. Subsequently, these seven pools were grouped into three which are essentially a single field intersected and divided by a state line. In Kansas, there are probably 50 pools, originally carried as individual discoveries which have been later combined with Silica, Kraft-Prusa, Hall-Gurney, Gorham, Trapp and Bemis. Thus, an actual discovery reported with individual production may at any time be dropped from the list by merger with other pools.

Since The Oil and Gas Journal does not report production from fields having less than 200 bbl. production daily, the record of actual discoveries shown in Table 1 has been taken from the A.I.M.E. and Oil Scouts' Yearbook. From this table it can be seen that the proportion of "actual discoveries" to "reported discoveries" has declined steadily since 1939. It can, moreover, be seen that the number of actual discoveries, or new fields having reported production, is over 25 per cent larger than the number which remain in the records as separate fields.

Analyzing the data shown in Table 1, it is apparent that there has been a small increase in the total number of actual discoveries of new pools from which production is reported since 1937. This increase is, however, unimportant and may be due, in part, to the fact that more complete production records are being kept on individual pools than in former years.

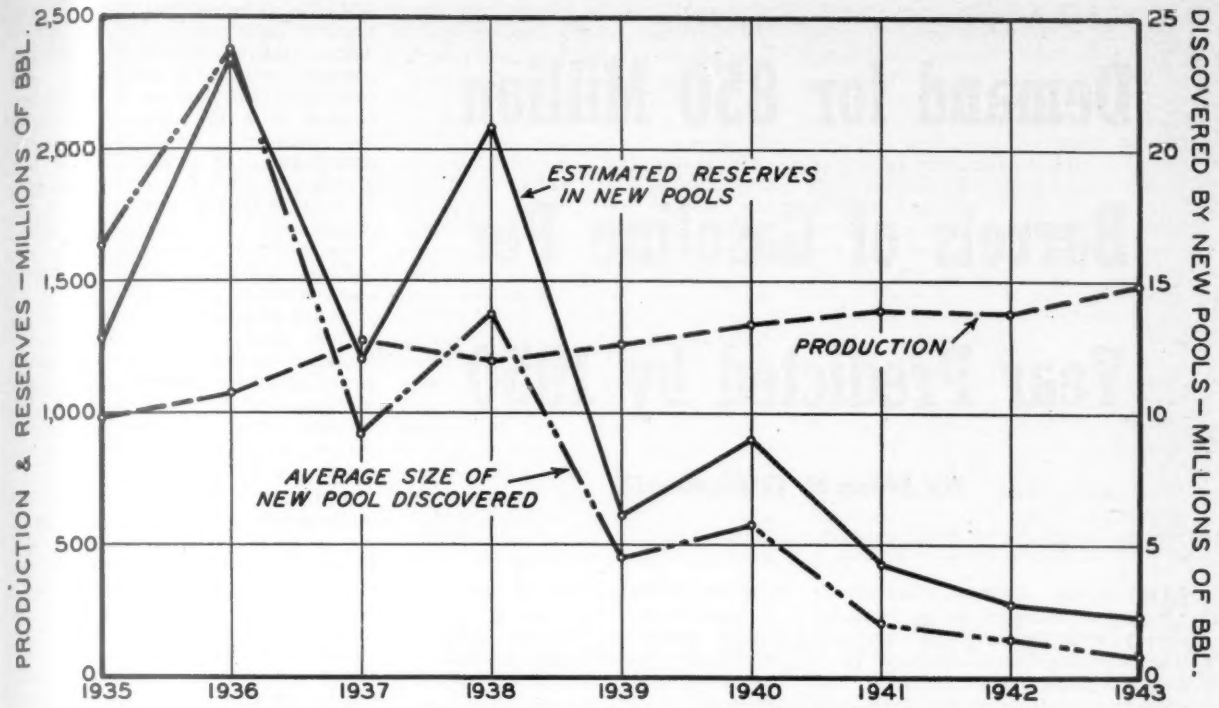
If Illinois and Kansas are dropped from the list, the former because of the basin play which started in 1937 and both because the number of fields removed from the list of producers by merging with others is abnormally large, the increase in actual discoveries disappears.

If, therefore, the average size of the discoveries remained constant, the American oil industry might be considered as just about holding its own. In the issue of February 10, it was pointed out that only one 100,000,000-

TABLE 1—OIL DISCOVERIES IN THE UNITED STATES*

Year—	Reported†	Actual	Ratio actual : reported	On production 1939	On production 1942
1935	211	100	.473	83	78
1936	268	117	.436	102	98
1937	220	155	.705	141	132
1938	278	194	.698	171	152
1939	224	154	.687	154	133
1940	292	183	.625	...	156
1941	412	224	.544	...	211
1942	399	182	.456	...	182
1943	395	209	.529	...	...

*Kentucky, Ohio, Tennessee and District 1 omitted. †1935-36 A.I.M.E., 1937-42 Lahee, 1943 The Oil and Gas Journal.



Declining size of newly discovered pools and their reserves plotted against rising production

TABLE 2—SIZE OF DISCOVERIES IN THE UNITED STATES

Year—	Number*	Est. reserves†	Average†	10,000,000-bbl. pools	Est. reserves†	Average†	Minor pools	Est. reserves†	Average†
1935	78	1,264,782	16,215	21	971,509	46,262	57	293,273	5,145
1936	98	2,341,311	23,891	32	2,202,715	68,834	66	138,596	2,100
1937	132	1,206,287	9,138	21	1,026,200	48,866	111	180,087	1,622
1938	152	2,085,030	13,717	26	1,774,720	68,258	126	310,310	2,462
1939	133	604,653	4,546	18	466,380	25,910	115	138,273	1,202
1940	156	902,616	5,786	14	541,420	38,672	142	361,196	2,543
1941	211	428,158	2,029	10	186,790	18,679	201	241,368	1,201
1942	182	269,700	1,482	4	81,500	20,375	178	188,200	1,057
1943	209	190,385	911	3	39,500	13,133	206	150,885	732

*Actual discoveries remaining in production. †Thousands of barrels.

bbl. pool had been opened since 1939. Carrying the lower limit of major pools down to 10,000,000 bbl., the number found in 1942 and 1943 combined was less than half of the number found in any year from 1935 to 1939. The average size of these intermediate and major fields has also declined to about 20 per cent of the levels reached in 1936 and 1938. The average size of all pools found in 1943 was less than 10 per cent of the average between 1935 and 1938 and less than 20 per cent of the caliber of the average pool found in 1939 or 1940 (Table 2).

Thus, the record of discoveries, if confined to the number alone, tells less than half of the story. Domestic production has been maintained since 1938 by the intensive development of known producing areas. The estimated proven reserves rose steadily until January 1, 1943, because of proven additions to old fields but only in 1940 did estimated reserves from new pools equal as much as half of the year's output during the past 5 years. The United States currently has largely exhausted the potentialities of its older pools and new reserves added in 1943 were only slightly more than one-eighth of that year's production.

Mid-Continent Section of A.P.I. to Meet in Tulsa

The Mid-Continent section of American Petroleum Institute will hold its annual meeting May 25 and 26 in the Mayo Hotel, Tulsa, it is announced by H. W. Ladd, manager of materials for Stanolind Oil & Gas Co. and general chairman of the section. J. R. McWilliams, general manager of production for Carter Oil Co., is general chairman of arrangements.

Special Petroleum Section Is Established for Army

CAIRO.—A special petroleum section to act as a coordinating agency and to advise the commanding general of United States forces on all matters concerning oil has been created, with Stacey Adams, of the Engineer Corps, as its head. Adams, formerly of Palm Beach, Fla., served as petroleum officer for the U. S. Army in the Mediterranean theater before he was assigned to this region.

As the Middle East command becomes increasingly involved in economic and supply matters rather than operational matters, the need for a special petroleum section became essential.

A.P.I. Division to Consider Pacific Coast Problems

The petroleum supply situation on the Pacific Coast, oil on the public domain, and practical problems of drilling and production technology in wartime will be discussed at the spring meeting of the Pacific Coast district of American Petroleum Institute's Division of Production, to be held in the Biltmore Hotel, Los Angeles, Calif., Thursday, March 23. W. L. Jarvis, of The Texas Co., is chairman of the program committee.

Demand for 850 Million Barrels of Gasoline Per Year Predicted by 1950

by John P. O'Donnell

NEW YORK.—Postwar prospects for the oil industry in the fields of supply and demand, refining and transportation were analyzed in a group of papers presented before the economics division of the Petroleum Division, American Institute of Mining and Metallurgical Engineers, at the annual meeting here last week.

C. L. Burrill, Standard Oil Co. of New Jersey, in estimating postwar consumption of oil products, predicted a demand for gasoline of 850,000,000 bbl. annually in 1950, an increase of almost 27 per cent over 1941.

T. E. Swigart, Shell Pipe Line Corp., analyzed possible postwar uses of the 24 and 20-in. lines and found any advantages over tankers too slight to justify their purchase and operation by private companies.

W. G. Moore, Gulf Oil Corp., and T. J. Elder, National Refining Co., reporting on the effect of catalytic cracking, found that there would be a substantial increase in the volume of light products at the expense of residual fuel oil.

Industry's Investments Defended

John D. Gill and B. A. Stainton, Atlantic Refining Co., found ample justification for the investment in the oil industry in refuting critics who would regulate the industry. They termed this a problem which may transcend all others.

Joseph E. Pogue and F. G. Coqueron, Chase National Bank, examined the course of capital in the industry and found that "the oil economy is functioning soundly and effectively."

Sidney A. Swensrud, Standard Oil Co. of Ohio, showed that the 24 and 20-in. lines might well be used for natural gas in the postwar era since they connect the greatest source with the greatest market.

E. E. Rosaire, Subterrex, in reviewing the discoveries of recent years, revealed the importance of new areas of operation and new methods of discovery, citing the Permian basin as an example of the former and reflection seismography as an example of the latter.

In related papers presented on other occasions during the institute meeting, Wallace E. Pratt, Standard Oil Co. of New Jersey, said that if "political and economic conditions permitted us to undertake the job of oil finding over the earth at large in the same way we have in our own country, we should be able to establish petroleum reserves adequate for man's needs over the long future," and William B. Heroy, PAW, outlined a policy of world oil control "that can be used as a most effective implement in the preservation of world peace."

Pratt spoke at the petroleum-division dinner on the petroleum resources of the United States and saw danger in the confusion arising from the failure to distinguish between proved reserves and total oil resources available. He laid the danger to the fact that, under the influence of this confusion, "ill-considered policies spring up and flourish choking out the most valuable fruits of the long past experience of the American petroleum industry."

He reviewed potential oil sources and summarized the outlook: "If we confine our attention to the area of first-class promise only, if we consider only that portion of first-class area within easy reach of the drill and if we apply to this restricted portion Trask's estimated average organic content for the floors of all existing seas, 2.5 per cent, we still obtain a quantity of organic matter so large as to be fantastic in comparison with the known petroleum reserves of the earth."

Heroy presented his policy at a symposium on postwar mineral control. He demonstrated that "in the present development of the art of war, a vital element is the ability to produce and store petroleum" and concluded that "control of production coupled with the control of stocks may then be used to assist in the preservation of peace." From this premise he offered these suggestions: Control of crude petroleum at the source, control of overseas transportation, control of manufacture of petroleum products, control of stocks, and control of aviation fuels.

"If the three great powers which at present control most of the world's oil resources can agree among themselves as to the manner in which such controls shall be exercised," he said, "all the essential elements for the curbing of any future attempted aggression will have been realized."

Heroy also spoke before the Society of Economic Geologists, a division of the institute, as its retiring president. He cautioned that "we cannot escape the operation of the law of diminishing return in oil finding and we should not lightly disregard those signs which point to the effectiveness of its operation." He predicted that "by far the larger part of newly found oil will continue, as in the past, to be found in traps that can be detected by structural methods of approach."

Rise in Cars Forecast

Dr. Burrill's estimates were based on assumptions that the war in Europe would end this year and in the Far East next year. His conclusions on gasoline demand involved estimates of consumption per vehicle and the number of vehicles in use. He estimated 31,819,000 passenger cars would be in use in 1950, consuming an average of 18 bbl. each, a total of 572,000,000 bbl. This represents the largest bulk use of gasoline. Aviation demand, he predicted, would show the largest percentage gain, rising from 12,756,000 bbl. in 1941 to 30,000,000 bbl. in 1950.

In summarizing his estimates, he said that they "indicate a demand in 1946 of approximately 12 per cent less than in 1944, the estimated peak war year, and only 3.4 per cent less than in 1941. Subsequent to 1946 the estimates show consistent annual increases so that the 1941 demand is exceeded by 1947 and by 1950 it is 17.5 per cent greater than in 1941."

Moore and Elder, in their study of effect of catalytic cracking, reached the following conclusions: (1) Most important is greatly increased flexibility of operation; (2) there will be a substantial increase in the volume of light products from crude, either in the form of gasoline or light distillates; (3) while the amount of residual fuel oil per barrel of crude will be less, the quantity of crude run will also determine the total supply; (4) gasoline of higher octane will be

made and the proportion of cracked to straightrun will increase; (5) the quantity of distillate fuel that can be made will be substantially greater but there will be an increase in the percentage of cracked fuels for household heating, necessitating adaptation of burners to its use; (6) there will be a reduction in the crude required for a given amount of gasoline and distillate fuels at the expense of residual fuel; (7) there will be an increase in the production of gas but some will be usable as in production of high octane blending components.

The Gill-Stainton analysis of investment in the oil industry developed a substantial basis for the conclusion that investment in the industry has been prudent. Among their conclusions were the following:

The petroleum industry investment was as sound as any major industry's and sounder than most. Net capital assets of all manufacturing companies declined 30 per cent from their 1930 peak whereas 24 oil companies eliminated only 18 per cent. In 1937 the manufacturing industry was able to produce 3 per cent more goods than in 1929 with 24 per cent less plant but oil companies had 23 per cent more production and required 14 per cent more plant to do it, proving that the oil industry had less excessive or useless capacity.

$16,200 Invested Per Worker

The industry employs vast amounts of capital at the saving of large amounts of labor. This is demonstrated by the fact that in 1940, the latest year for which comparable data are obtainable, capital invested per worker in petroleum refining was $16,200 against an investment per worker in manufacturing as a whole of only $6,200.

The unique character of the petroleum industry, dominated by the law of probabilities of crude-oil discovery, and characterized by periods of cheap, plentiful production which induces the expansion of facilities, alternating with periods of shortages when demand tends to run away from supply, has constituted a set of conditions unknown to any other large industry. The remarkable fact is that the industry has been able to maintain a tolerable state of equilibrium.

Superficial critics have criticized the apparently surplus capacity which has sometimes resulted but the cost to the public has actually been but a small fraction of the values of the products which the developing technology provided, i.e., between 1920 and 1943, 22.2 billion barrels of crude oil have done the work that it would have been necessary for 38.8 billion barrels to do in supplying gasoline without the help of the cracking process.

In his thorough appraisal of postwar value of the big and little-inch lines, Mr. Swigart viewed them from a variety of standpoints: taking crude or products from the Gulf to the East Coast or District 2, or taking products or imported crude from the East Coast to District 2. He pointed out that while there was a small margin for the big-inch versus tanker costs, no one company had the capacity to fill or utilize the capacity of the line, that feeder line costs would raise the 24-in. line total cost and would eliminate the 20-in. line from consideration, that their use as product lines would leave a distribution problem on the East Coast not encountered in the use of tankers serving any port and that almost impossibly large batches of products would be required to prevent large-scale contamination.

Only one paper on foreign production was formally presented during the foreign-oil symposium. This was a paper on Brazil by Dr. S. F. Arbeu in which he said that production in Brazil was running slightly less than 1,000 bbl. per day and came mostly from the Lobato area in the State of Bahia near San Salvador. This field is in a Cretaceous basin between two fault blocks. The oil is 41.5° A.P.I. gravity, has a lower sulphur content, 0.002 per cent, and is highly paraffinic, approximately 21 per cent. It was pointed out in subsequent discussion that Brazilian operations are exclusively government controlled and that development has been limited. The country, largest in the Western Hemisphere, has had not more than 150 wells drilled in it, including the 20 or so in San Paulo.

A paper by Lt. B. O. Lisle, U.S.A., photo intelligence officer, discussed results of bombing oil objectives in Europe. It reported that the Ploesti refineries raid was based on studies by the pilots of full-scale maps in the African deserts. Bombing was concentrated on the large refineries which resulted in reduction of the quality of Rumanian products.

Renegotiation Based on Tax Reports

FORT WORTH, Tex.—Nearly 50 experts on petroleum-industry taxation attended the 2-day session here last week of the Mid-Continent Oil and Gas Association's standing committee on taxes.

H. D. Mahin, Phillips Petroleum Co., Bartlesville, Okla., and T. H. Marshall, Anderson-Prichard Oil Co., Oklahoma City, Okla., were reelected chairman and vice chairman, respectively, of the tax group.

Friday morning, T. Dwight Williams, C.P.A. of Oklahoma City, led the meeting in the consideration of the procedure for renegotiation of war contracts. Williams, a tax attorney and an accountant, is also field assistant to the Naval Price Adjustment Board which is currently in the process of reviewing war contracts. The renegotiation process may affect practically every refiner and marketer of petroleum products in the country because of sales directly to the services, to firms engaged in supplying the services and in conjunction with expansion programs. Credit is given on taxes for profits lost through renegotiation. Much of the information used in renegotiation is taken from company tax compilations.

Relief provisions under the excess-profits tax law was the topic for the Friday afternoon gathering which was led by Lloyd C. Gibson, tax engineer and lawyer for Standard Oil Co. of New Jersey, New York City.

H. D. Mahin and T. H. Marshall were reelected chairman and vice chairman, respectively, of the Mid-Continent Oil and Gas Association's standing tax committee at a session in Fort Worth, Tex., last week

Navy's Oil Reserve in Alaska May Be Explored

WASHINGTON, D. C.—Opening of the Navy's 35,000 square mile untouched oil reserve at Point Barrow, Alaska, is being urged by Rep. Norris Poulson, California, who told the House last week that "failure to develop the Point Barrow reserve cost the taxpayers of this country the $130,000,000 which was paid for the Canol project."

Poulson said that the Alaskan reserve, established in 1923, is believed by many geologists and oil engineers to be one of the finest potential oil areas in the Western Hemisphere. Private American interests have drilled extensively in other Alaskan areas, with little or no success, although oil was found at Fort Norman, across the border in Canada. The private exploration, Poulson said, proved the wisdom of the Navy in putting a fence around the 22,400,000 acres considered Alaska's most likely oil land.

Poulson quoted Wallace E. Pratt, vice president of Standard Oil Co. (New Jersey), and geologist William T. Foran on the quality and indicated amounts of oil available at Point Barrow. The oil, Pratt said, contains a valuable lubricating fraction, and is low in sulphur. Weathered samples show a gravity of 18.6 degrees, A.P.I. scale, fresh oil might be lighter.

Oil seepages in the area have been noted for many years. Seepages at Cape Simpson are considered the result of a slightly fractured oil rock, with fault vent to the surface, evidence that oil has accumulated in the subjacent area.

Eight major anticlines suited to the accumulation of oil cross the reserve area from east to west, and the source region for oil is suggested by oil shales in the zone below the coal series. Porosity, sand and shale conditions in this series, according to Foran, are well suited to migration and pooling of oil. This geologist's analysis of residue of seepage oil suggests that it is comparable to Gulf Coast crude and similar to crude from the Texas Blue Ridge field.

According to Poulson, the Navy plans to send oil experts to the Point Barrow reserve within a few weeks.

Majewski Sees Small Units Blighted by Government

DES MOINES, Iowa.—"The smaller units in the oil business are doomed if, as and when the Government goes into the oil business either here or abroad," declared B. L. Majewski, vice president of Deep Rock Oil Corp., speaking before the annual meeting of Iowa Independent Oil Jobbers' Association here last week. Majewski, who is chairman of the committee on marketing of Petroleum Industry War Council appointed by Administrator Harold L. Ickes, continued:

"If you share my fears and belief, and if you want the American system of free enterprise to prevail, protected by existing autitrust statutes and not a totalitarian system with possible reprisals dictated by political expediency, make your opposition to Petroleum Reserves Corp. or any other similarly conceived governmental agency, known immediately to your senators and congressmen

"I want government out of the oil business as soon as possible, domestic or foreign. I don't like the plan of the PRC to build and own a pipe line in the Middle East. No one should be deceived into believing that the government's participation starts and ends with the pipe line. The Government retains permanent ownership, and the companies using the line agree to maintain a large oil reserve for the exclusive use of the Government. Also the deal involves a sales or marketing agreement subject to the control of the State Department."

DEATHS

Fred W. Miner, 70, veteran of the oil-well supply business, died February 20 in Pittsburgh, Pa. He went to Pittsburgh 40 years ago and was associated with National Supply Co. until 1918, when he established a business of his own. In recent years he had been connected with Frick-Reid Supply Corp.

Charles B. McClanahan, for 20 years a pumper for Gulf Oil Corp. in the Kiefer, Okla., district, died February 21.

Thomas F. Carr, 75, employed by Gas Service Co. for 20 years until his retirement, died February 23 in Wichita, Kans.

Curtis Hall Montgomery, 46, geologist and petroleum engineer, for 20 years employed by Continental Oil Co. and its predecessor, Marland Oil Co., in California operations, died February 22 in Los Angeles.

Wilbur E. Shockley, 59, oil-well contractor, died February 20 at his home in Houston, Tex.

Charles E. White, 24, a gager for Magnolia Pipe Line Co. at its tank farm near Midland, Tex., was overcome by gas fumes while gaging a tank February 20 and died in a Midland hospital the next day.

Jesse Jay Ricks, 64, chairman of Union Carbide & Carbon Corp., died February 20 at his home in Plandome, N. Y. A graduate of Michigan Law School, he became a member of a Chicago firm which handled legal matters for Union Carbide Co. Upon the formation of Union Carbide & Carbon Corp. Ricks helped to complete legal arrangements, joined the new corporation and became in succession chief counsel, president, and chairman of the board.

George L. Craig, 78, pioneer Pennsylvania oil operator, died February 19 at his home in Sewickley, Pa. He entered the oil business in 1885 in the Kane field, Pennsylvania, opened by his brother, the late Joseph W. Craig, and Jo P. Cappeau, now of Tulsa.

William F. Fraser, 65, refinery superintendent for H. F. Wilcox Oil & Gas Co. at Bristow, Okla., died February 24. He was a graduate of Oberlin College and served as food administrator in Trinidad under President Hoover. From 1918 to 1920 he represented Swift Oil Co. in France. He had been with Wilcox since 1931.

Charles B. Colby, 77, president of Caminol Oil Co. and active in Los Angeles and Bakersfield, Calif., oil developments for a quarter-century, died February 24 at his ranch home in Palmdale, Fla.

Dr. Roy E. Dickerson, 66, chief of the technical section, Petroleum Division, Foreign Economics Administration, died February 24 in a New York hospital. Doctor Dickerson, who resided in Arlington, Va., had gone to New York to attend the meeting of American Institute of Mining and Metallurgical Engineers. He graduated in science at University of California and received M.S. and Ph.D. degrees from that institution. Following 18 years as a teacher he became geological superintendent for Standard Oil Co. of California. In 1926 he joined Atlantic Refining Co. as its chief foreign geologist, remaining in that post until his recent government appointment.

Francis M. Blair, 32, engineer in Houston, Tex., for the natural gas and natural-gasoline industry committee of the Petroleum Administration for War, died February 25 in a Houston hospital.

Dr. Douglas W. Johnson, 65, executive officer of the geology department of Columbia University, died February 24 of a heart ailment in Sebring, Fla. He held honorary degrees from the universities of Grenoble, Nancy, and Montpelier, France, and from Denison University, Ohio.

James E. O'Donnell, 70, who was active in developing the Bixby Heights area of the Signal Hill oil field, died February 24 while supervising the drilling of a well in Santa Maria, Calif.

Pooling of Raw-Material Resources

Gives the United States Its Largest

Butadiene-From-Petroleum Factory

by Arch L. Foster

One-seventh of all the butadiene which this country will need to meet its requirements will be manufactured in the plant of Neches Butane Products Co., Port Neches, Tex., which opened formally last week. This article describes the plant in detail, and how the butadiene will be manufactured. An article describing the opening ceremonies appears in the news section of this issue.

BUTADIENE for a quarter of a billion pounds per year of synthetic rubber—enough rubber to build more than 28 million tires—that is the quota which Neches Butane Products Co. set for itself back in the middle of 1942 when the huge plant being operated for Rubber Reserve Co. on the Texas Coast was projected and construction was started on the largest petroleum butadiene plant of its kind.

For a hundred thousand short tons of butadiene will be made per year in this largest of all petroleum butadiene plants, made from refinery still gases of which more than five times that weight of gas must be processed to obtain the diolefin butadiene, principal ingredient of synthetic tire-type rubber. And a hundred thousand tons of butadiene when copolymerized with styrene in the proportions of approximately three to one, and compounded with carbon black, plasticizers, softeners, inhibitors, and other modifiers will make 134,000 short tons of synthetic rubber. And the greater portion of this product comes from materials of which the average petroleum refiner was contemptuous until the Japanese conquest of the East Indies brought him up short.

To accomplish this result the company is erecting 48 fractionator towers, to separate the desired from the undesired products made in the two identical 50,000-ton-per-year units constituting the plant. The largest of these towers is 14-ft. diameter and is as high as a 17-story building (175 ft.). One bubble plate has enough space for a good-sized bedroom with a fireplace in lieu of the downspouts. The steel in a single such tower will make more than 20 normal-sized railroad tank cars, including the wheels. So huge and bulky are these larger towers that they must be built in two sections erected alongside each other, with vapors and liquids transferred mechanically or otherwise from one section to the other.

In full operating schedule this plant will generate a total of 60,000,000 lb. of steam per day, or 72,000 boiler hp. in four huge boilers each larger than the average private city residence. This steam in large proportion is superheated to a high temperature and performs three distinct operations before being discharged from the system, as is outlined later herein. Steam-driven compressors totaling 12,000 hp. handle the hydrocarbon

View of North unit prior to erection of any of South unit

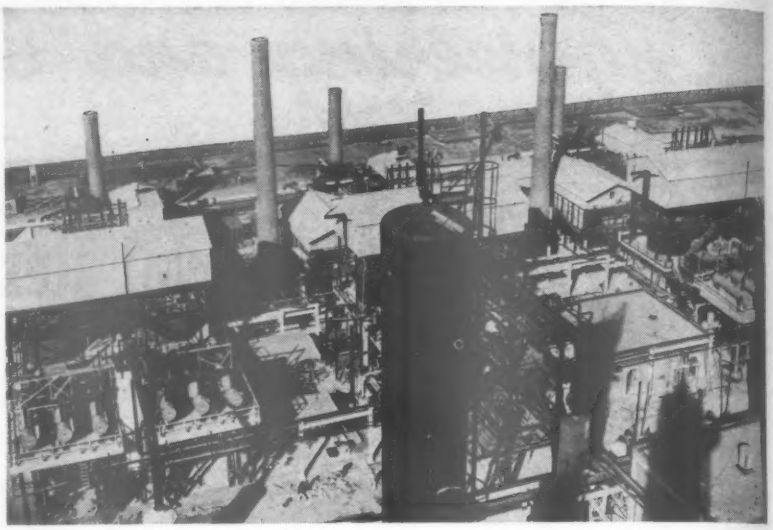
gases processed in the plant to facilitate the process and separate the desired product from unreacted materials.

The plant is being constructed on the low prairie of the East Texas coast, midway between Port Arthur and Beaumont, both of which cities are refining centers. Absence of foundation bedrock at any reasonable depth made it necessary to "float" these extremely heavy items of the equipment on concrete piles set in the soil, a depth of 40 ft. being used for the towers which place the highest unit load on their bases; some of these towers weigh 200 tons and more, and rest on bases covering 200 to 250 sq. ft. of ground, thus aggregating loads up to a ton per square foot of surface.

The plant occupies 314 acres of the marshy prairie. Layout of the plant was begun by surveying the plot, building a high fence around it, building roads into it and digging drainage ditches, without which no plant site on the Gulf Coast can be occupied satisfactorily.

"Butadiene Boulevard." North unit in foreground, South unit in background

The primary items in the plant include the 4 large boiler installations, 48 fractionator towers with their condenser and heat-exchanger accessories; 42 Hortonspheres were installed to store the charge stocks and butadiene product under pressure, the largest of these spheres holding 12,000 bbl. each, and in total they represent the largest pressure-storage capacity in any petroleum refinery in the country. A water supply to handle more than 300 million gallons per day for cooling and condensing on a once-through basis was installed, the water coming from the Neches River nearby through a covered aqueduct. A feature of this installation is the adjustable blade with 8-ft. 8-in. diameter discharge pumps employed to force the water into the plant mains; the impeller blades of these centrifugals are variable pitch, similar to the airplane propellers now used. By remote electrical control this pitch may be changed at will by the operator and so the amount of water delivered by the pumps may be varied as required. Of interest within the plant is a battery of 10 centrifugal pumps, each handling 24,000 g.p.m. and which supply from the common source the water needs of various units in the plant. The inlet aqueduct is a mile long, while the outlet carrying the used water back to the river at a lower point extends for several miles. Boiler water is obtained from a local source, and is treated in a special unit to condition it for steam making. Cooling-water pumps are driven by gas engines operating on natural-gas fuel, available to the entire plant at very low cost, and the total expense for cooling water is pumping cost.



View of dehydrogenation unit

Cranes Handle Equipment

Because of the huge size of the equipment in this plant, its condensers and heat exchangers for example, six Gantry cranes are provided which move on tracks alongside the condensers with floor levels at the level of these units. By this means the exchanger-tube bundles or entire condensers or exchangers may be removed easily and quickly for any purpose, and returned as easily to its place when ready for resumption of service. Use of Gantry cranes resulted in saving of considerable permanent structures normally installed for the purpose of handling and removing condensers, coolers, etc.

The methods by which most of these various equipment items were obtained makes a new "high" in industrial plant construction. Port Neches is far from fabricating centers. Military equipment had first priorities in the fabricating plants of the country, and delivery dates for equipment for this plant were in the uncertain but obvious dim and distant future. The Lummus Co., contractors for engineering and construction of the plant, aided by the five companies involved in it—Gulf Oil Corp., The Texas Co., Pure Oil Co., Atlantic Refining Co. and Magnolia Petroleum Co.—began the assembly of lathes, hydraulic presses, rolling mills and other equipment necessary for the fabrication of plant units on the job. This fabricating equipment was assembled in temporary quarters in Port Neches.

Welding is a large part of the work of fabricating refinery and chemical plant equipment. Due to inability to obtain used welding equipment, priorities were obtained for purchase of electric welding units of a recently developed type. It was also necessary to employ from outside sources a nucleus of skilled, experienced workmen, and have these men train the entire force of inexperienced employes in their various jobs. When the parallel jobs of collecting and arranging the fabricating equipment, and of training personnel were completed, the building of these several units was begun. Sheet was rolled and towers assembled and welded, bubble plates installed and the towers

View of water-treating plant

were ready for erection.

Several advantages resulted from this arrangement. Closer correlation and liaison between the fabrication and erecting groups were maintained; less delay between fabrication and arrival on the job occurred. The towers, even the longest, were built in one piece, whereas customary practice is often to build them in sections which are shipped to the plant site, assembled and welded to complete the tower on the job. An old locomotive was rebuilt and refitted, a special spur track was laid between the shop and plant and the various units were transported on this track by this ancient engine to the site of erection. The erection operation is conventional, differing in this plant only in the size and number of the units involved.

To reduce the steam load required by the plant, in which huge amounts of processing steam as well as power steam are used, the system was laid out to use the same steam in three different steps. First it is used at high superheat in processing steps where extremely high temperatures are required. Following this step it is used to supply heat for medium and low-temperature distillation such as in fractionation of raw charge stocks or reaction mixture of liquids for the separation of different components. Lastly this steam, reduced in temperature to a low degree of superheat or even to mere saturated steam status, powers all compressors and pumps of the plant, eliminating the necessity for electric motors or other prime movers. This system reduces the total steam requirements to a rated 60,000,000 lb., or 72,000 boiler hp., per day, supplied by the four boilers mentioned above.

The process division of the plant is divided into two units, the north and south units. Each unit has a rated capacity of 50,000 short tons of butadiene per year, and the plant was divided into two units of the designed size rather than to arrange it all in one superhuge unit which would permit less flexibility and possibly offer greater operating, synchronizing and control problems than two smaller units present. Of the 48 fractionating and recovery towers, 27 are located in the north unit. This unit includes six towers, heaters and condensers for the purification and recovery of solvent liquids employed in the process, which will serve both units and of which no necessity for duplication exists. Thus each process unit requires 21 towers for the production of 50,000 tons of butadiene annually.

This plant was conceived early in 1942. Much of the intervening time was spent in building and working out details of a workable process. Since the entire program at the plant site must be started "from scratch" a great deal of time was spent in building accessory equipment and facilities, as will be outlined later.

Manufacture of Butadiene

The synthesis of butadiene may be carried out by a large number of processes, most of which are not commercially or technically feasible, in the light of present developments. About one-half of the 700,000 tons of butadiene to be made annually in this country will be produced from alcohol according to present plans and already several such plants are operating. The other main process uses hydrocarbons as raw materials, dehydrogenating normal butene, for example, to form the diolefin butadiene. In the Neches plant a narrow-boiling fraction is obtained from each of the cooperating companies from their cracking unit operations, containing a high percentage of butenes (butylenes) both normal and iso forms along with butane, isobutane and small amounts of other impurities. This fraction is the so-called "B-B cut" from which normal butene is removed and concentrated either by distillation or by solvent extraction or both; the hydrocarbons other than butenes are returned to the refinery for such processing as may be desirable.

The first step in dehydrogenation of the butane charge stock is carried out therefore as a side reaction in the thermal and catalytic cracking of petroleum and/or natural-gas hydrocarbons. The Neches plant receives its raw charge with one-half the dehydrogenation work accomplished and must then complete the process and concentrate the product.

As carried out in the Neches plant, the concentrated butene fraction of the B-B cut is mixed with steam at high superheat, the steam thus serving both as a heating agent to raise the butene to dehydrogenation temperature and as a diluent to aid in proper control of the reaction. This mixture is passed in contact with a catalyst through a reaction zone wherein two more hydrogen atoms are removed from the four-carbon molecule and forming the molecule known as a conjugated double-bond or conjugated diolefin molecule, C_4H_6 or butadiene.

Erection of tower in South unit

The reactions involved are:

1. In the thermal and catalytic-cracking units either butane gas or a heavier hydrocarbon is partially de-

The Grizzly Bear is large, heavy and rough—a full-grown specimen often measuring nine feet and weighing approximately a thousand pounds. It is said to be one of the most tenacious of all wild animals, and a formidable foe when wounded.

WHY GRIZZLY DRILLS MORE FOOTAGE

---and More Wells

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ROTARY HOSE
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Complete Warehouse Stocks Maintained At:
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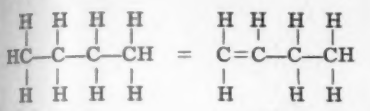
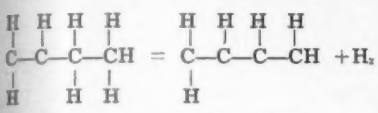
hydrogenated by heat and pressure to form butene:



C_4H_{10} Butane — C_4H_8 n-Butene

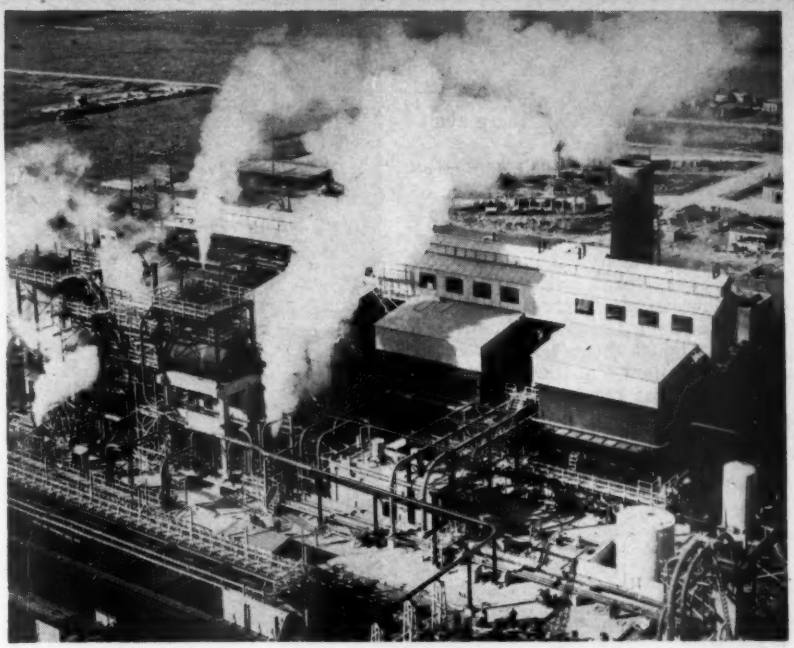
2. At high temperature and in the presence of a dehydrogenating catalyst the second reaction takes place:



n-Butene — Butadiene

Butadiene boils at minus 4.7° C. (+23.5° F.); butene boils at minus 6.1° C. (+21° F.), and n-butane boils at minus 0.5° C. (+31° F.). We see that a margin of only 10° F. exists between these three closely associated hydrocarbons. Their separation after formation of butadiene and/or butene is therefore one of the three major steps in the process, one which has offered serious drawbacks to its satisfactory solution but which has been solved.

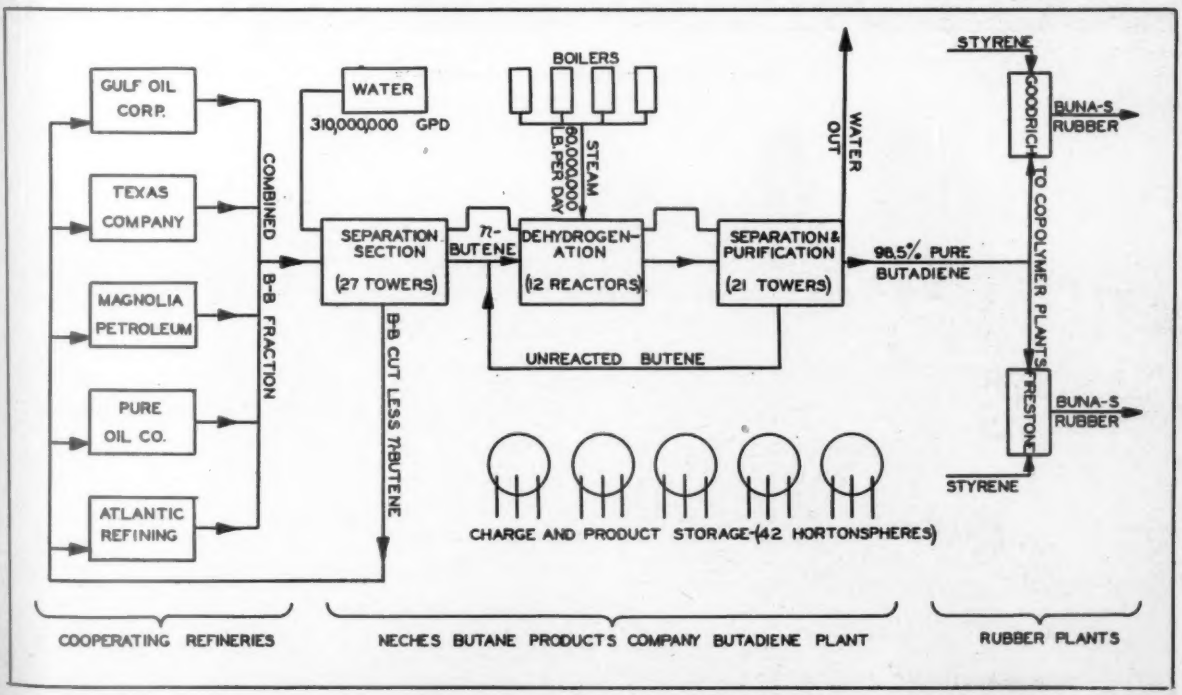
Charging about 18,000 bbl. per day of the B-B cut high in butenes drawn from each of the five associated refineries, a single pass through the catalytic reaction zone converts a fraction of the butene present to butadiene. The reaction mixture is cooled, practically all of the diolefin removed and the remaining unreacted butene is recycled; that is, is mixed with superheated steam again and passed through the reaction chamber in contact with the catalyst to convert more butene to butadiene; this process continues without hindrance, fresh butene being added continuously to make up for that removed during the reaction pass and subsequent butadiene removal.



Boiler house on initial operation

Personnel and Housing Problems

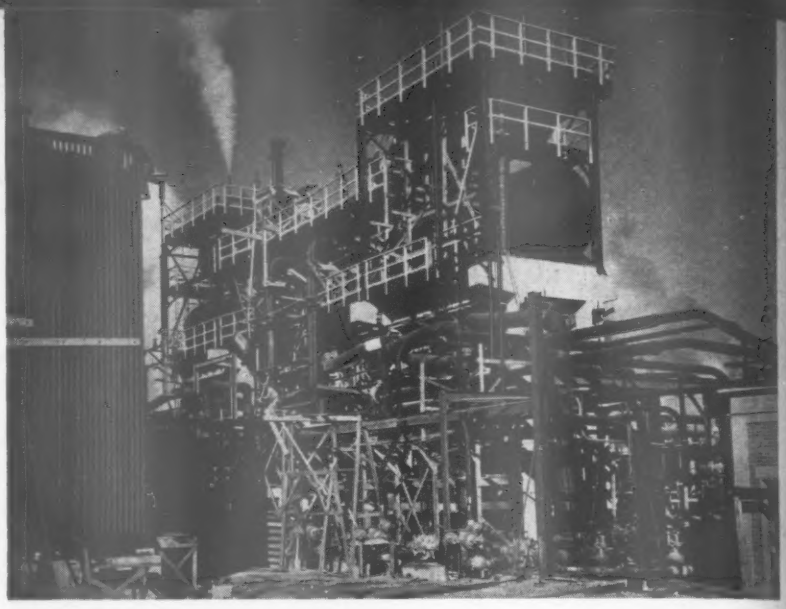
The expression "starting from scratch" applies to every phase of the Neches plant. At the outset the site was selected in semiopen grazing marshland, devoid of any industrial improvements of any kind. Port Neches is a small river-and-canal town of a few hundred people. Neither Beaumont nor Port Arthur boasts of population enough to supply large numbers of workers for an entirely new venture. To build this plant has required the work of some 6,000 men and women although about 10 per cent of that number will be adequate staff to operate the plant. A relatively small number of extra residences were available within several miles of the plant and the influx of emergency personnel into this area engaged in other important war indus-

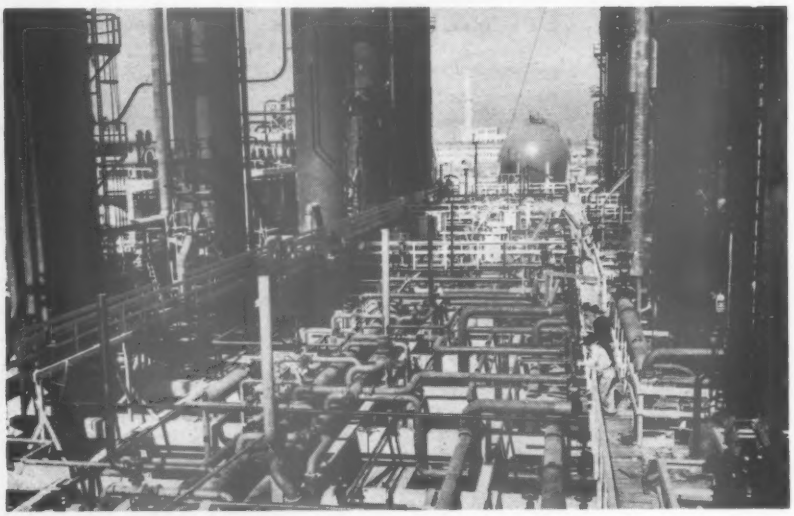


Simplified flowchart of the five-company-operated butadiene plant at Port Neches, Texas, and the cooperating rubber plants

tries had long since filled these available accommodations.

The company assembled 700 large automobile trailers from all parts of the country and arranged them in a systematically planned trailer camp, to house the workers brought in. Defense Plant Corp. built about 700 temporary houses. These and the privately owned trailers brought in, served to house the 6,000 workers on the Neches plant and the 4,000 people working on the two copolymerization or crude-rubber units being built alongside. The workers themselves came from all directions and walks of life, some skilled in industrial trades, some fresh from farm, ranch and forest and most of them must be trained intensively for their duties at these plants.



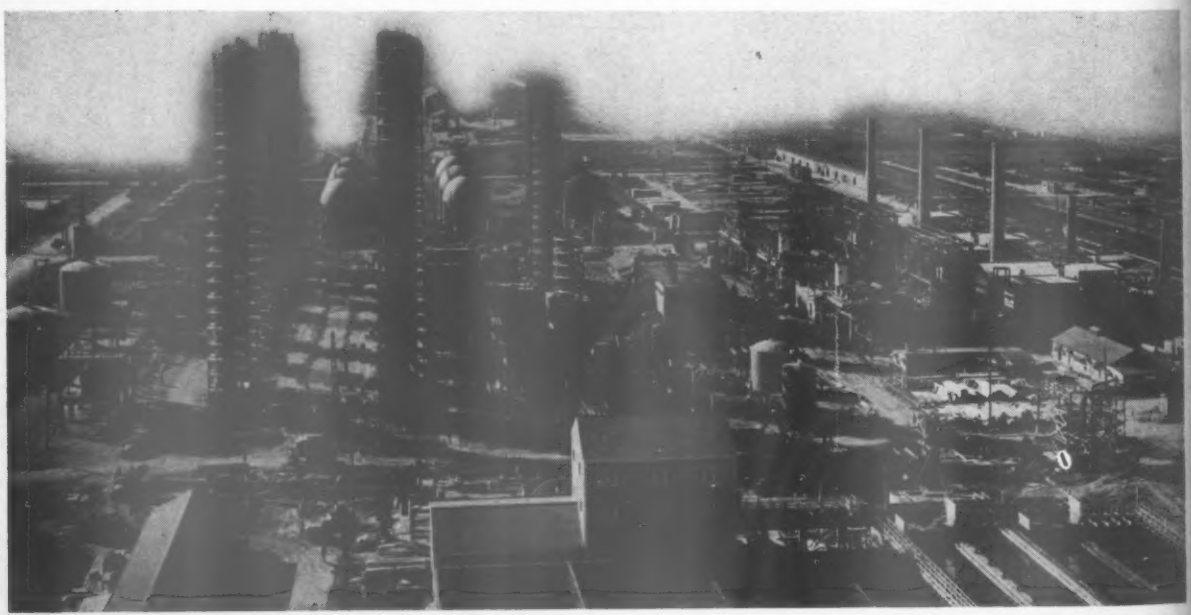


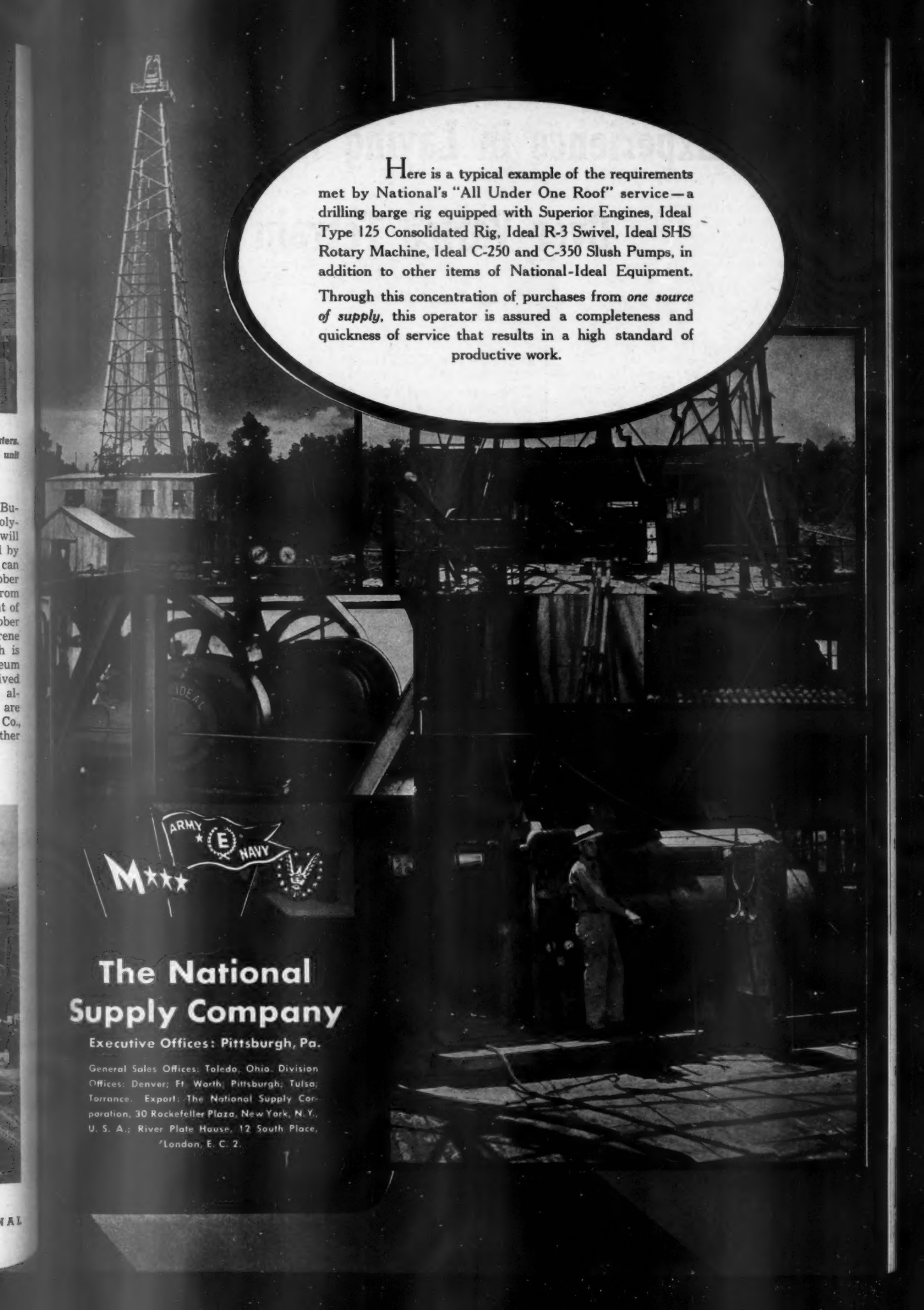
Above: Boiler-feed-water deaerating heaters. Left: Pipeway between towers of North unit

Synthetic-Rubber Plants

While not a part of the Neches Butane Products Co. unit, two copolymerization plants built nearby will absorb all the butadiene produced by the Neches plant. These two units can each make 60,000 long tons of rubber annually, combing the butadiene from Neches with one-third that amount of styrene to make the crude rubber known as GR-S or buna-S. Styrene is a derivative of benzene which is made from either coal or petroleum and ethylene, which may be derived from cracked still gases or from alcohol by dehydration. Both plants are operated for Rubber Reserve Co., one by B. F. Goodrich Co., the other by Firestone Tire & Rubber Co.

South unit in initial stages of construction





Here is a typical example of the requirements met by National's "All Under One Roof" service—a drilling barge rig equipped with Superior Engines, Ideal Type 125 Consolidated Rig, Ideal R-3 Swivel, Ideal SHS Rotary Machine, Ideal C-250 and C-350 Slush Pumps, in addition to other items of National-Ideal Equipment.

Through this concentration of purchases from *one source of supply*, this operator is assured a completeness and quickness of service that results in a high standard of productive work.

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Experience in Laying WEP Lines Over Varied Terrain

by Paul Reed

RESULTS obtained in laying War Emergency Pipelines, Inc.'s 1,388-mile 24-in. crude-oil line and the 1,640-mile 20-in. products line demonstrate the capacity of modern pipe-line-construction methods for dealing with the problems of the varied terrain along a route traversing nearly half of continental United States, between Texas and the New York-Philadelphia area. The fact that both lines were completed in advance of station construction confirms the confidence of the management that such huge pipe-laying undertakings could be carried out fairly close to required schedules.

The steady progress consistently made throughout the laying of line for these projects is reflected in data which can be reviewed now. The average completion per day per crew for the entire job has been given as 0.66 miles. Comparison of figures on the construction of the two lines indicates that the average daily output per day per gang for the entire length of time each was in the field was 50 per cent more for laying the 20-in. than for the 24-in. line. A large part of this difference may be accounted for by the fact that the 24-in. crude-oil line begun August 1, 1942, and completed in 350 days, had to be laid through the unfavorable conditions of mid-winter and early spring while the 20-in. products line, begun April 27, 1943, and completed in 225 days, by December 9 of the same year, was mostly laid during the good weather of summer and fall months.

In laying the WEP 24-in. and 20-in. lines from Texas to New York every type of terrain was traversed which is to be found in the eastern half of the United States. Summaries of rates of progress and methods applied are presented in this article from data collected in frequent visits to work in sections between Houston and Longview, Tex., and Philadelphia, Pa.

The average daily figures of 11.82 miles laid for the 24-in. and 16.83 miles for the 20-in. do not represent averages for any particular days but for entire jobs. Peak days have been reported as 9.02 miles in laying the 24-in. and 19.91 miles in the laying of the 20-in.

The rates of laying are higher for both lines in sections west of the Mississippi River where the daily average was 0.47 mile of 24-in. and 0.615 mile of 20-in. These rates were figured on the basis of the entire time that contractors' gangs were in the field; consequently such daily average output is figured lower that for the shorter periods when actual pipe laying was in progress. However, progress of certain spreads in sections of Indiana and Ohio was comparable to good results west of the Mississippi.

The highest daily averages per spread were between 0.626 and 0.783 miles west of the Mississippi River and 0.567 miles and 0.720 miles east of it in laying the 20-in. Individual good days for the same line would run from 5,000 to 7,000 ft. for a gang in single days with exceptional days for single gangs sometimes going as high as 9,000 to 10,000 ft.

Direct Comparison Misleading

Direct comparisons between rates of laying 24-in. and 20-in. in particular sections are frequently misleading because of a number of factors including differences in weather conditions, regularity of pipe deliveries and changes in gang personnel. Because of war demands on the mills there were periods when pipe deliveries to the 20-in. products line were interrupted. Special allocations of pipe frequently had to be made to insure that work could be pushed at points where progress was most important.

Some delays occurred in the section west of the Mississippi River as the result of a policy to avoid putting water in lines laid in low ground and at river crossings as ballast; this entailed relaying some of these sections when they floated out during high water.

To meet completion schedules the work was divided into short sections where conditions were most difficult. From the seven sections assigned in Pennsylvania for laying the 24-in. line, sections in this same area were increased to eight for the 20-in. construction.

The effectiveness of electric welding in the field was attested by the

Fire bending for stove-pipe method of laying 24-in. pipe in Pennsylvania

Above: Bending rig developed especially for cold bending of large diameter pipe of WEP project. Right: Bending 20-in. pipe for products line with hinged bending shoe at base of tractor in Arkansas

results of water tests on the legs of both lines west of Norris City, Ill., and during months of operating the entire 24-in. crude line to the East Coast during which not even a pinhole leak was found in a field weld. So satisfactory had the welding construction proved to be that water testing of the eastern extension of the 20-in. line was only deemed necessary in sections containing pipe made by a process which had been faulty.

In the laying of the eastern extension of the 24-in. and the entire 20-in. line special attention was given to the location of air blowoff connections in hilly country because of their importance during the filling of large-diameter lines. No trouble was reported due to clogging of lines with ice during early pumping operations in winter months.

The adequacy of standard pipe-line methods applied by aggressive and resourceful contracting organizations is indicated by their ability to meet all conditions. Adverse conditions on the right-of-way were also overcome by stringing contractors. Care in the handling of this heavy large-diameter pipe was important for the efficiency of the work because damage to pipe during unloading could cause serious delays.

The "straight-line" method of ditching early in the laying of the 24-in. line made it possible to go ahead without the "roading" necessary for "section" ditching.

The main features of the relative merits of stove-piping and firing-line methods have been established in the minds of pipe-line men for several years. But the effective use made of stove piping on a variety of terrain showed what could be done with this method in the extensive laying of such large-diameter pipe. Many of the contractors made use of stove piping and firing line for different conditions of terrain. During the laying of these lines, one contractor carried on work extensively with the stove-piping methods at all of its spreads. The shorter time required for the training of roll welders and the speed with which pipe can be welded by them on favorable terrain have been attractive features of the firing-line method. In addition to savings, due to lesser tractor equipment required, some of the benefits of stove piping are intangible ones resulting from the closer coordination and supervision of a compact gang, which is possible by its use. Rate of progress figures in themselves for all the spreads do not indicate pronounced differences in results from use of the two methods. This is because of the variety of conditions under which sections of the lines were laid. In commenting on the two procedures, B. E. Hull, vice president and general manager of WEP in "Building the 'Big Inch' Pipe Lines," A.P.I., November 10, 1943, remarks that stove piping was applied "with equal or better results."

In some localities and at certain periods, more effort had to be given to lining up joints than was normally necessary. Various explanations were offered for this condition which was by no means prevalent or serious. To improve line-up operations a special clamp was designed, in the course of the work, which was found to be too cumbersome for continued use.

A bending rig developed especially for WEP big-inch pipe is reported to be a distinct improvement over previous methods, which achieved large savings. The use of factory bends applied for a while was discontinued because of the additional amount of welding necessary. What was accomplished in various improved methods for cold bending 24-in. and 20-in. pipe for WEP has exceeded expectations. Before the projects were started there had been a widespread impression that such large-diameter pipe would require hot bending altogether.

Service men of organizations furnishing construction equipment on the line and coating and wrapping materials were constantly in the field to insure that desired results might be obtained. Coating and wrapping were applied on both lines as far east as Central Ohio. From there to Phoenixville, Pa., the line was spot coated where surveys indicated that protection was necessary. Experience in laying the line demonstrated the advantages of tractors of the heaviest type for the dope gangs and lowering in, the rate of which often determines the speed at which the whole spread can go ahead.

Both of the WEP lines have been completed close to schedule at costs considerably below amounts assigned to their construction based on original estimates. Much credit is given to contractors' ability to accomplish this in spite of rising costs and scarcity of labor and equipment.

Gas liquefaction plant of East Ohio Gas Co., Cleveland. At left are the new toro-segmental tank and three spheres

Methods of Storing Natural Gas to Relieve Peak Demands on Fields

by J. French Robinson*

There are four general methods for storing natural gas. The factors entering into the application and operation of each are discussed in this article. Of the four methods, underground storage, where available, offers particular advantages, and within recent years has developed into fast increasing usefulness. In publication of this article credit is given to West Virginia Engineer, College of Engineering, West Virginia University.

IN recent years, due to increasing industrial, commercial and domestic consumer requirements, peak demands for natural gas have been created, particularly in winter, that cannot be met with the available output of existing gas fields, by the capacity of existing gas-transmission systems, or with the maximums of both. Where this situation exists, or can be predicted, it is necessary to store natural gas by one or more of several methods during periods of low demand for use when demands rise to the point where they cannot be met from the usual sources of supply. Storage of gas becomes the only answer. It is an established and a rapidly developing practice in the operations of many natural-gas companies.

Natural gas can be stored by four general methods: First, as gas at low pressure in the conventional cylindrical gas holders; second, as gas in gas holders under medium pressures of from 5 to 25 lb.; third, as a liquid, at extremely low temperatures in well-insulated alloy steel tanks; and fourth, underground, as gas, at high pressures in the pore space within certain geological horizons, usually in depleted or partially depleted natural-gas fields.

The conventional low-pressure gas holders came into existence with the manufactured-gas industry, many years ago, and are used by it primarily. Many natural-gas companies originally were either manufactured-gas companies, or, in the course of their expansion, have absorbed or inherited manufactured-gas plants, and therefore own gas holders.

These holders are of two general types: The older water-sealed kind, where an inverted cylindrical tank alternately rises and falls within a tank of water as the gas is admitted or is withdrawn; and the newer, so-called dry holder, in which the holder roof is really a piston that rises and falls inside the cylindrical holder wall.

These low-pressure holders vary in capacity, from very small to a maximum of 20,000,000 cu. ft. The latter may have a diameter of 325 ft. Very large dry holders are as high as 400 ft.

As the total capacity of the holders which a natural-gas company may have is usually a small percentage of the company's peak daily demand, the natural gas stored in low-pressure holders can only be used to meet short peaks or peaks that are relatively low.

The present-day cost of constructing low-pressure gas holders is about $80,000 per 1,000,000 cu. ft. of storage capacity, and is so high as to be prohibitive of consideration when the storage of very large quantities of natural gas is under discussion.

A second method of storage is the one, long in quite common use, by which gas is compressed into closed steel containers of varying shapes and sizes, at pressures ranging from 5 to 30 lb. per sq. in.

The cost of construction with this type of storage is at the rate of approximately $200,000 per 1,000,000 cu. ft. of storage capacity.

A third method of natural-gas storage which has been demonstrated as highly successful but is still very new, is the liquefaction of gas and storing it in liquid form for regasifying and distribution when needed. Natural gas stored in liquid form occupies only about one-six-hundredth of the space required in the low-pressure holder.

*President, East Ohio Gas Co.

Contrary to the general belief, gas is liquefied by a combination of refrigeration and compression, rather than principally by compression, which is a commonly held supposition. In this process, gas is first compressed to about 600 lb., cooled to about —130° F. by ethylene and ammonia, and then allowed to expand suddenly to a pressure of about 3 lb. The sudden expansion in heavily insulated vessels drops the temperature to —257°. Storage in well-insulated containers can be effected over long periods of time without building up high pressures.

The only plant for liquefying, storing and regasifying natural gas, of which I have knowledge, is located in Cleveland, Ohio, and is owned and operated by the East Ohio Gas Co.

This plant was put into operation in 1941 and has been in continuous and successful use since that time. It has a liquefying capacity of 4,000,000 cu. ft. of natural gas per day and a regasifying capacity of 70,000,000 cu. ft. per day. The capacity of the plant, both for liquefying and regasifying, varies somewhat according to the composition of the gas supplied to it.

The plant consists primarily of (a) apparatus to remove all the moisture and carbon dioxide from the natural gas prior to its liquefaction; (b) six gas engines having a total of 3,400 rated hp., which supplies the power for compressing the natural gas and the ammonia and ethylene that are used as refrigerants; (c) four tanks, well insulated, for storing the liquid natural gas; and (d) three steam-heated tube-type special heat exchangers which are used to regasify the liquid natural gas as needed.

Three of the storage tanks consist of two concentric spheres, the inner sphere 57 ft. in diameter and the outer one 63 ft., the 36-in. space between the inner and outer spheres being filled with cork insulation. Each of these spheres, when full, contains liquid gas which is the equivalent of 50,000,000 cu. ft. of natural gas at normal temperatures and pressures. The cubical content of the inner, or holding sphere proper, is 97,000 cu. ft.

The fourth in this series of liquefied natural-gas storage containers consists of two vertical cylinders, one within the other, and equidistant from it at all points. The inner cylinder has a diameter of 70 ft. and a height of 43 ft. The uniform space of 3 ft. between the two cylinders is packed with rock wool insulation. This storage holder contains the equivalent of 90,000,000 cu. ft. of natural gas at normal temperatures and pressures, and has a cubical content of 176,000 cu. ft.

There must be some free space above the liquid in each container. Hence the equivalent in gas of this plant's total storage capacity can be only approximated as 240,000,000 cu. ft.

It is interesting to note that it requires considerable heat (20,000,000 B.t.u. per 1,000,000 cu. ft. of gas) to return this extremely cold liquid natural gas to its natural and gaseous state. When the plant is regasifying at its maximum rate, 2,200 boiler hp. is required to supply sufficient steam for this process.

The cost of the liquid gas plant was $1,700,000, or the equivalent of $7,100 per 1,000,000 cu. ft. of storage. The results of its operation to date have been most successful.

From the operating standpoint, liquid-natural-gas storage may be used to a particularized advantage on a natural-gas distribution system. System pressures can be allowed to drop much lower than would be safe operating practice if no liquid-natural-gas storage were available. This type of storage is particularly valuable for meeting sudden peaks in demand, such as result from very fast drops in atmosphere temperature.

In contrast to liquefied-gas storage which, though demonstrated to be successful, is new to the point of novelty, underground storage of natural gas has been practiced for more than 25 years. The Menifee field in Kentucky, and the Zora field near Buffalo, N. Y., were the first large fields to be used.

It is only in the past few years, however, that underground storage of natural gas has been developed into its present and fast increasing usefulness. The demands for gas for civilian use and for war industries have increased by leaps and bounds all over the United States, and in many cases the available gas supplies have not been sufficient to meet these demands. In some instances curtailment in delivery has resulted.

Underground Storage

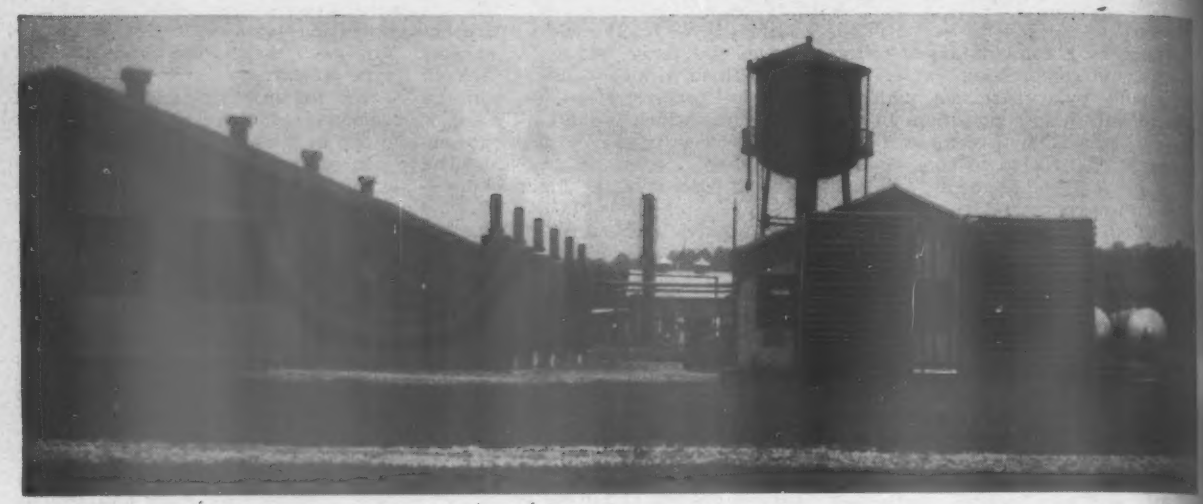
This situation is particularly pressing and increasingly critical in the vital industrial areas centering in Cleveland, Pittsburgh and Wheeling. These communities, for the most part, obtain their gas supply from the great Appalachian gas-producing area where gas is produced from many horizons, varying in geologic age from the early Pennsylvanian to the Silurian. The natural-gas reserves of this region are about 6 per cent of the total natural-gas reserves in the United States, but the users supplied from it consume about 16 per cent of all the natural gas sold in the United States. The discrepancy between these two figures tells it own story.

The Appalachian fields are fighting a losing battle against depletion, and because of it, and in order to maintain deliveries and service, many of the operating gas companies dependent upon Appalachian supplies, long since found it necessary to establish underground storage areas for seasonal reserves. Their development and extension are accelerating.

Another factor which has hastened the development of underground storage of natural gas has been the rapid growth of long-distance pipe lines. Economy dictates that these lines be operated at full capacity at all times. It has therefore been necessary to provide underground storage in which to accumulate surplus gas from the pipe lines during periods of low demand.

Fifty or more natural-gas-storage areas are to be found in the United states and Canada. Many of them are located in the Appalachian area, others are in the Mid-Continent region, in the Pacific Coast area and in Canada. These areas vary in size from a few acres to several thousand,

Interior of Robinson gas station showing five 600-hp. compressor units



Chippewa repressuring station, a part of East Ohio Gas Co.'s underground storage system

and may contain from 1 billion to many billion cubic feet.

Underground storage areas are usually filled during offpeak periods by one or more of the following practices, sometimes simultaneously: (a) Withdrawing gas from highly competitive areas; (b) continuously taking gas from a large number of small low-output wells that cannot be turned on and off economically to meet changing demands; (c) using the surplus capacity of long-distance pipe lines.

The following factors are to be considered when selecting and locating an underground storage operation:

1. Location—adjacent to large distributing centers.

2. Size: (a) Small, if it is to be used for peak-hour and peak-day demands; with high rock pressures so that large volumes can be withdrawn in a short time.

(b) Large, if it is to balance out a system or to balance out the load factor on a long-distance pipe line.

3. Type of reservoir—size of wells:

(a) Porosity of gas-bearing stratum.

(b) Its permeability.

(c) Freedom from water.

(d) Structural features, including faults, etc.

(e) Control of wells and acreage by the operating company.

(f) Storage rights.

4. Compressor-station site:

(a) Available land.

(b) Accessibility to water.

(c) Proximity to storage area or areas.

(d) Nuisance risks involved such as noise and vibration in neighboring communities.

(e) Transportation: (1) Employes; (2) materials.

(f) Nearness to main distribution or trunk pipe lines.

(g) Number of operating wells.

5. Legal: The legal aspects and ramifications of the rights covered by an underground storage reservoir are many. Contracts must be negotiated with all well owners and landowners in the area for the rights to repressure gas through the wells into the storage horizon, to store the same, and to withdraw it.

It is important that all of the acreage and wells in an underground storage area be owned or controlled by one operator, or by a single group of operators, so that the entire area can be operated as a unit.

Prevention of Gas Loss

In a properly selected storage area, there should be no loss of gas during the storage process, whether by migration to uncontrolled areas, or by withdrawals from uncontrolled wells. This can be checked by comparing the amount of gas that must be injected into the area to raise the rock pressures a given amount with the amount of gas that must be withdrawn from the area to reduce the rock pressure the same amount. If the quantity withdrawn is equal to the quantity injected, there has been no loss during storage.

If the selected storage area is near both high pressure (say 500 lb. per sq. in. and over) and medium pressure (say 100 lb. per sq. in. and under) pipe lines, the area can be filled from the higher-pressure line and emptied into the lower-pressure line without the use of a compressor station. The practical pressure differential depends upon operating factors.

In most cases, however, a compressor station must be built near the storage area to take gas from a feed line and force this gas into the pore space in the gas horizons. Pressures used in this process are in excess of 1,000 lb. per sq. in.

To illustrate the operating conditions of an underground storage operation, I can best use the Chippewa area of The East Ohio Gas Co. The limits of this pool are completely controlled by stratigraphic trapping. Its area covers approximately 6,000 acres, has 18 active wells, and a 1,020-hp. compressor station. Storage actually began in this pool the latter part of 1941, at which time the rock pressure was 416 lb. This pressure has been built up to 1,000 lb., and at this pressure the total amount of gas in storage is 6,000,000,000 cu. ft., which includes 3,250,000,000 cu. ft. of gas reserves in the area at the time underground storage started. At the pressures given in the table below, gas can be withdrawn from the area in the following quantities per day:

Pressure (lb.)	Cu. ft.
1,000	25,000,000
900	22,000,000
800	17,000,000
700	14,000,000
500	8,000,000
400	4,000,000

To lower or raise the rock pressure 1 lb., 12,300,000 cu. ft. of gas must be withdrawn from or forced into this storage area. The total cost of this storage area is $1,000,000, including the 3,250,000,000 cu. ft. of gas in reserve prior to the time storage was begun.

In conclusion it can be said that each of the four methods of gas storage has its peculiar and particular place in the operation of gas properties. The first three, medium and low-pressure storage in holders, and storage of gas in liquid form, perform highly particularized, perhaps narrowly specific functions in maintaining balances between gas supply and consumer demand. But in addition to all of them being vital factors in company operating, the full, broad impact of underground storage on the national economy, as well as the natural-gas industry, can be judged from the fact that, as of December 1, 1943, the underground gas-storage capacity of the areas in the United States now in use for that purpose was 135,000,000,000 cu. ft., with a delivering capacity of 750,000,000 cu. ft. a day.

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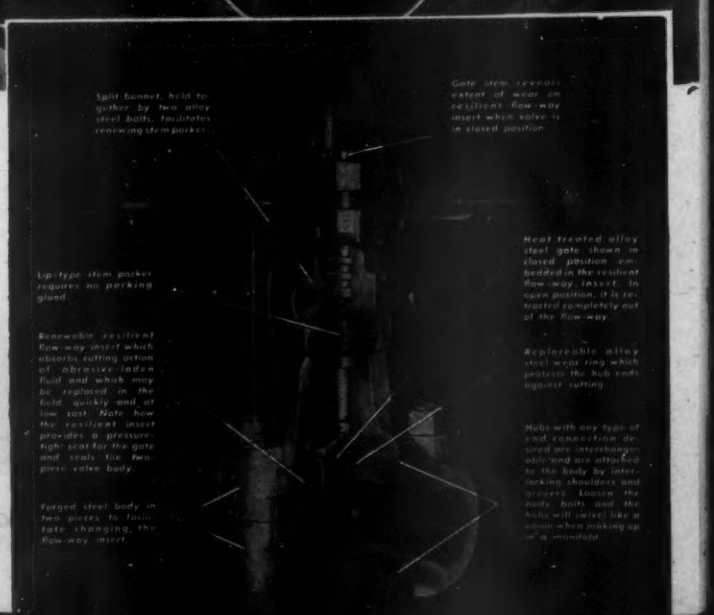
Of equal importance to the extremely low maintenance cost of Cameron Flex-Seal Mud Line Valves is the dependable seal which it provides. Note in the cut-away view at right the generous reserve of resilient gate packer material, or flow-way insert, and the gate stem which reveals the extent of wear on the gate packer when in closed position. Thus, the valve may be easily kept in efficient sealing condition at all times. When repairs are needed they may be made at the rig with ordinary tools by any member of the drilling crew . . . quickly and easily.

Complete details on 2000, 4000 and 6000-lb. test Cameron Flex-Seal Mud Line Valves are carried in your Composite Catalog, or literature will gladly be sent on request.


Split bonnet, held together by two alloy steel bolts, facilitates renewing stem packer.
Gate stem reveals extent of wear on resilient flow-way insert when valve is in closed position.
Lip-type stem packer requires no packing gland.
Heat treated alloy steel gate shown in closed position embedded in the resilient flow-way insert. In open position, it is retracted completely out of the flow-way.
Renewable resilient flow-way insert which absorbs cutting action of abrasive-laden fluid and which may be replaced in the field quickly and at low cost. Note how the resilient insert provides a pressure-tight seal for the gate and seals for two-piece valve body.
Replaceable alloy steel wear ring which protects the hub ends against cutting.
Hubs with any type of end connection desired are interchangeable and are attached to the body by interlocking shoulders and grooves. Loosen the body bolts and the hubs will swivel like a union when making up on a manifold.
Forged steel body in two pieces to facilitate changing the flow-way insert.

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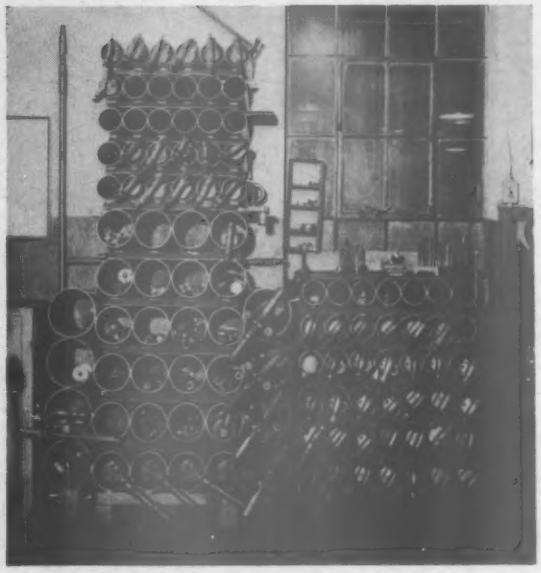
PLANT PRACTICES

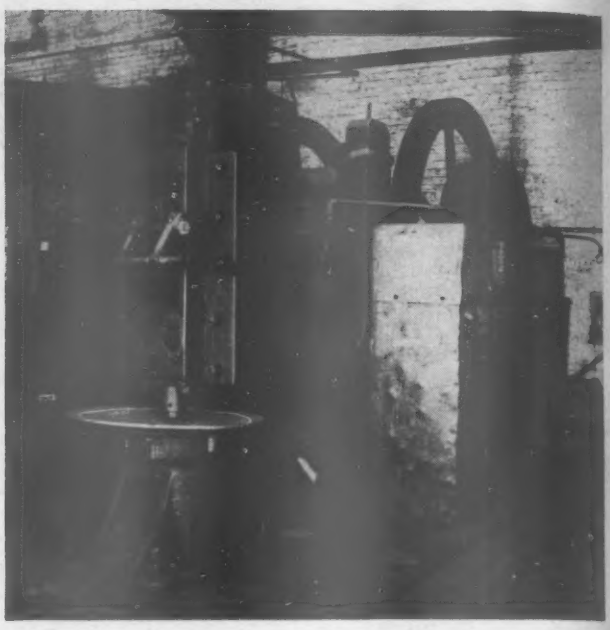


Tool and Air-Hammer Rack

A SIMPLE, rugged and easy-to-make rack for tools is that shown in the photograph, which was built at Standard Oil Co. of Indiana's Whiting, Ind., refinery to house air hammers, etc. The rack is built by tack welding to a suitable horizontal base a series of sections of pipe of the required diameters. These sections are spot-welded together, parallel, with a small strip of steel on edge underneath the front ends of the pipe sections so that the axis of the "pigeon hole" slopes slightly downward from front to rear. A second tier of parallel pipe sections may be welded above the first, either by fitting the upper sections into the trough between two lower sections, or by welding two steel straps across the lower tier and mounting the second tier atop these straps. It is not necessary to place a tilting strap underneath the front end of the second or succeeding tiers if they are placed parallel to the first tier. The pipe sections are 15 in. to 18 in. long, and 4 in. to 6 in. in diameter. The crossbars (straps) are 2-in. by 2-in. angle iron, and a succession of pipe sizes may be used. These pockets may be used for a variety of things, air and jack hammers, "concrete busters," riveters, wrenches, chisels, etc.

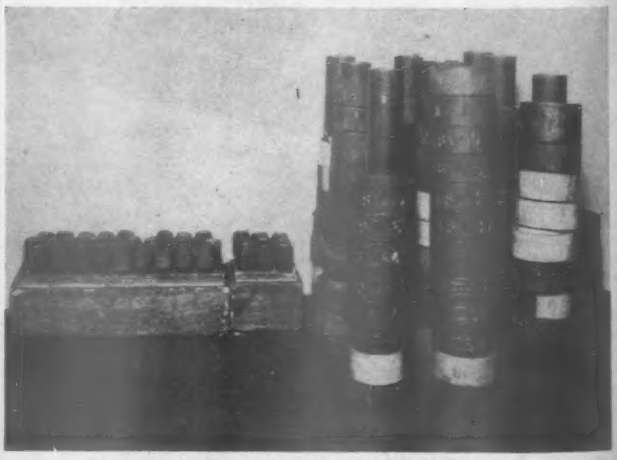
Press for Making Dished Sheets

FABRICATION of dished heads for cylinder and similar uses offers difficulties. An ancient motor-driven press was converted for this purpose by fitting on its fixed base a steel block in which a depression in the form of a very flat, wide cone had been milled. The movable plunger was fitted with a lightly rounded head about 3-in. in diameter. In actual operation a sheet is cut out, by torch or otherwise, of the size and dimensions required; two workmen handle the job. The sheet is placed on the base die with the edge near the center of the die, directly above the cone point or lowest point on the depression. The plunger is brought down slowly and presses the metal down near the edge until a slight curve is produced. The sheet is moved around a few inches, and the plunger again presses a slight curve in the metal. This is continued until the circuit of the sheet is completed, when the sheet is moved so that a new circle of pressure is begun and continued until that circuit is completed. This operation is continued systematically until the required degree of curvature is obtained in the entire sheet.



Hose Identification Bands

TO make it easy to identify steam or other type of hose with the department to which it belongs, Standard Oil Co. of Indiana's hose-repair shop cuts 2-in. sections of pipe of diameter to fit snugly on the hose, flattens a small strip on one side and stamps into the steel the abbreviation of the department and the number of the piece, or other identifying marks. Edges of the piece of pipe must be smooth-beveled or curved to avoid possibility of chafing or abrading the difficultly replaceable hose.



Directional Salt-Dome Well Employs Highly Accurate Drilling Technique

This article describes the procedure followed in drilling a deep well at Pine Prairie around the top of an overhang instead of through it. A scaled model of the project is presented in order to give a clear conception of the project

by E. H. Short, Jr.

A RECENT directional drilling job, which involved drilling around the overhang of a salt dome, typifies the highly accurate drilling technique now being employed in special cases along the Gulf Coast.

The well, E-5 Crowell & Spencer Lumber Co., located in the Pine Prairie, Louisiana, field was drilled by the Hassie Hunt Trust Co. The directional drilling was under the supervision of Houston Oil Field Material Co., Houston, Tex.

The usual schematic illustrations of directionally drilled holes have created a general impression (except for those actively engaged or closely associated in such work) that directional drilling simply involves turning the bit out in the desired direction and letting it go at a large angle of deviation from vertical.

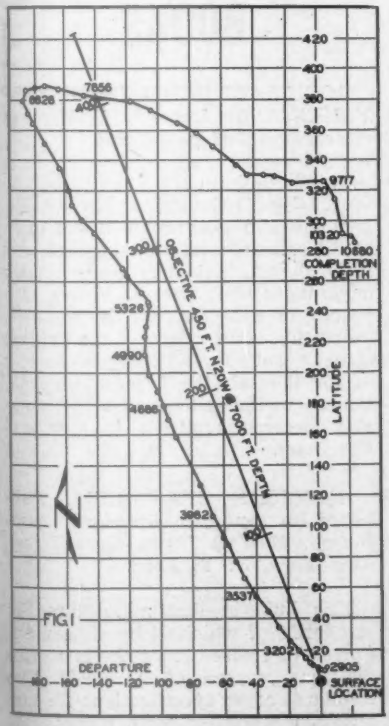


Fig. 1—Objective and actual direction of E-5 Crowell & Spencer Lumber Co., located in Pine Prairie, Louisiana, field

While under a special set of conditions such a rough and ready procedure might be employed, a majority of the directional drilling jobs require diligent and careful endeavor on the part of those supervising the work. Frequent surveys must be made, and the proper selection of the types of whipstocks and bits to be used to execute desired direction and deviation necessitates an extensive background of experience. The amount of weight to be carried on the bit and knowing how to take advantage of the formational dips are other factors which place this type of drilling operation in a highly specialized field of production operations.

In the directional drilling of the above well, the greatest angle of deviation from vertical was only 8¼°, and the bottom 1,000 ft. of hole did not exceed 3½°. The direction and angle of deviation was so minutely controlled that the record resembles that of a well drilled several years ago when considerable ingenuity was required to keep the hole straight. In other words, this directionally drilled well resembles what was considered a straight hole only a few years ago.

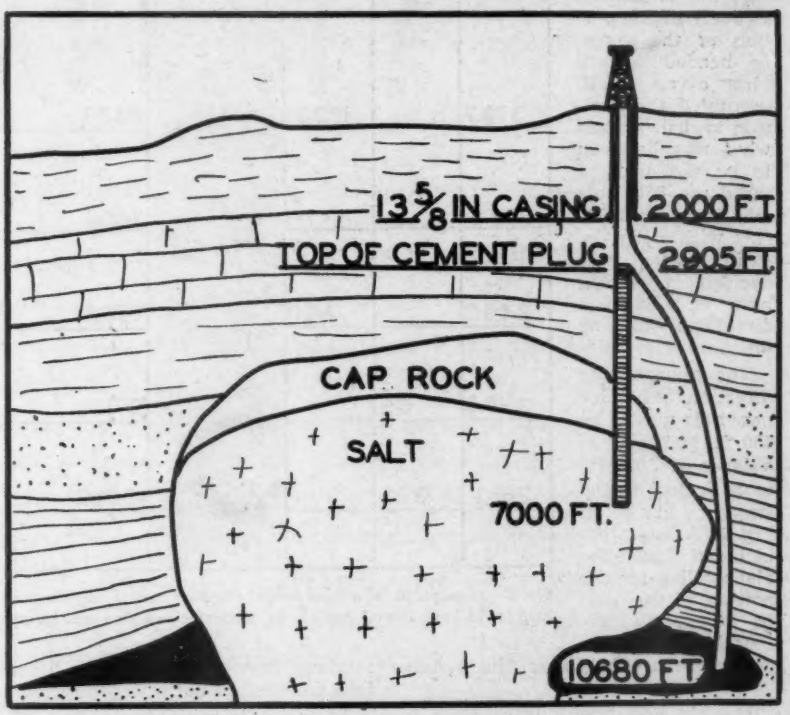


Fig. 2—Schematic diagram showing exaggerated deflection of the hole around overhang of salt dome

The well originally was drilled to a depth of 7,024 ft. where salt was encountered. It was believed that the salt was the top of a dome. At this point the mud became contaminated and resulted in sticking the drill pipe. It was necessary to cut the pipe free,

and the question arose as to whether an attempt should be made to continue drilling (on the chance that the hole was in an overhanging portion of the dome which would soon be penetrated) or plug back and attempt to drill around the dome.

The salt probably could have been penetrated satisfactorily through use of special muds. However, the economics involved, and the uncertainty as to whether the hole was located on an overhanging portion of the dome, or headed toward the core itself, prompted the decision to drill around what was believed to be the edge of the dome. The hole was cased to 2,000 ft. with 13⅜-in. casing and it was decided to plug back and begin a directional-drilling job.

The approximate direction of the new hole was to be 450 ft. N 20° W at a depth of 7,000 ft., as indicated by the straight line in Fig. 1. A limitation included in the plans called for the bottom of the well to be at a horizontal distance no greater than 330 ft. from the surface location.

DIRECTION AND DISTANCE IN FT OF DIRECTIONAL HOLE FROM VERTICAL PLANE			DEPTH OF HORIZONTAL PLANE INTERVAL FT
NORTH	EAST	WEST	
10.6	5.1		2905
20.4		13.7	3202
54.9		39.8	3537
107.3		67.2	3982
179.0		96.9	4686
212.4		109.4	4990
244.6		106.4	5326
379.7		187.3	6828
383.6		147.0	7856
349.3		64.0	8758
326.3	6.5		9717
285.1	27.5		10680

Fig. 3—Photograph of scaled model showing course of directional hole (solid line). Dotted line shows vertical plane from well location

The old hole was plugged back to 2,905 ft., using 100 sacks of cement. At this depth it will be noted (Fig. 1) that the hole was approximately 10 ft. north and 4 ft. east of the surface location. In getting off the plug a Fullgage deflector, a universal-joint-type tool, was used. At 2,965 ft. a Homco deflecting bit was run to correct direction and increase the deviation to the desired bearing.

To point the deflecting tools used during directional drilling an orienting sub and special instrument are used. The sub is placed above the deflecting tool in the drill string. When on bottom, an instrument, which registers the relative position of the tool in the hole, is run. The reading obtained is then compared with a previously taken open-hole directional reading. The tool may then be turned into the desired deflecting position.

To facilitate surveying as the hole progressed a core drag bit and bit plug was used. In taking a survey, the plug was retracted by wire line and the instrument run through the bit into the open hole. A special arrangement prevented the instrument from passing completely through the bit.

Effect of Hard Formation

At 4,990 ft. the formation became too hard for the core-barrel drag bit and the dip of the formation began to affect the direction of the hole. Apparently this tool slid with the formation which presumably dipped down from the dome. Therefore a rock bit was used to the base of the formation at 5,326 ft. By referring to Fig. 1 it will be noted that at this depth the hole had been taking an almost due north direction for the 400 ft. of hole drilled. To follow the northeast course decided upon, a deflector bit was put on at 5,353 ft. and the course taken almost paralleled the planned course to 6,828 ft.

At this point it was believed that the hole was below and around the overhanging portion of the dome, and inasmuch as hard formation was encountered, a rock bit again was run. From this point on to the total depth of 10,680 ft. it was not necessary to use deflector tools. Apparently the slope of the formation and the careful drilling technique employed during the last 4,000 ft. resulted in the hole being bottomed almost due north of the surface location. The horizontal distance of 285 ft. from the surface location was 45 ft. less than the limitation imposed when the directional-drilling plans were made. Surveys made at 10,520 ft. and 10,680 ft. showed less than 2° deviation from vertical. The well was completed as a producer.

The probable subsurface condition which prompted the drilling of the directional well is shown in Fig. 2. As in the case of all illustrations of this kind the direction and deviation from vertical is greatly exaggerated.

A better conception of the careful directional-drilling job involved in this particular case may be had from the photograph of a scaled model shown in Fig. 3.

BOOKS

ROCK SALT DEPOSITS OF WEST VIRGINIA. By James H. C. Martens, mineralogist. 67 pages, $.50.

This is bulletin No. 7, published by West Virginia Geological Survey. The geologic and geographic distribution of the salt deposits are discussed, and it is shown that they have certain advantages over natural brines as a source of salt for use in chemical industries. As a result of the drilling of deep wells for oil and gas, as well as for the salt itself, more information about the salt deposits will probably become available in the next few years.

AMERICAN STANDARDS. Published by American Standards Association, 29 West Thirty-ninth Street, New York, N. Y. Free.

This bulletin lists more than 600 standards, of which 64 have been approved or revised since the last price list was printed (April 1943). The standards cover specifications for materials, methods of tests, dimensions, definitions of technical terms, procedures, etc. The new list includes 95 safety standards.

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Effect of Engine Power Impulses on Single Pumping-Rig Speed Variations

*by E. A. Braker**

This article is a sequel to a discussion of "Methods for Engineering Peak Power Requirements for Single Pumping Rigs" by the same author which appeared in two installments in the January 13 and January 20 issues, respectively, of The Oil and Gas Journal. The previous discussion concerned chiefly the effect of design of pumping rigs and counterbalancing upon smoothing out peaks in power requirements. This sequel concerns the relationship of engine power impulses to speed variations.

THE formulas for prime-mover flywheel Wr^2 developed in the paper entitled "Methods for Engineering the Peak Power Requirements From Mechanical Single Oil-Well Pumping Rigs" do not include flywheel burden due to uneven torque from an engine's own power impulses. For heavy-duty engines with four or more cylinders, running over 900 r.p.m., the speed variation from this burden is too small and rapid to be measured by ordinary tachometers and can usually be disregarded. For single-cylinder and slow-speed engines, however, the power impulse flywheel burden is often more important than the burden from variations in the oil-well pump load.

Pressure Torque of Pistons

Fig. 1 shows how the gas-pressure torque exerted on the engine crankshaft by the pistons of a four-cycle carburetor engine varies above and below the average with increase in number of cylinders. All engines are shown producing the same horsepower at the same speed, except that a diagram is also shown for the four-cylinder engine producing the same horsepower at four times higher speed. Note how the amount of energy supplied per power impulse above the average (black areas) decreases both with increase in number of engine cylinders and with increase in engine speed. Comparative flywheel burden, under the conditions stated in the diagram, is represented by the black areas.

It will be observed that in four-cycle engines, each cylinder delivers a power impulse every two revolutions of the engine crankshaft. Total number of impulses per minute is then equal to number of cylinders × r.p.m./2. Useful work done in foot-pounds per minute is 33,000 × horsepower. Therefore, letting N be the average engine r.p.m., and Q the number of cylinders:

Useful energy per power impulse,

$$\text{ft.-lb.} = \frac{66{,}000 \text{ hp.}}{QN} \qquad (21)$$

Single-cylinder four-cycle engines deliver only one-fourth of the useful energy per power impulse to the load during the power stroke. The remaining three-fourths is stored in the engine flywheel to be gradually released during the exhaust, intake, and compression strokes. Therefore, the minimum flywheel burden in foot-pounds for a single-cylinder four-cycle engine driving a uniform load is three-fourths of 66,000 hp./N or 49,500 hp./N.

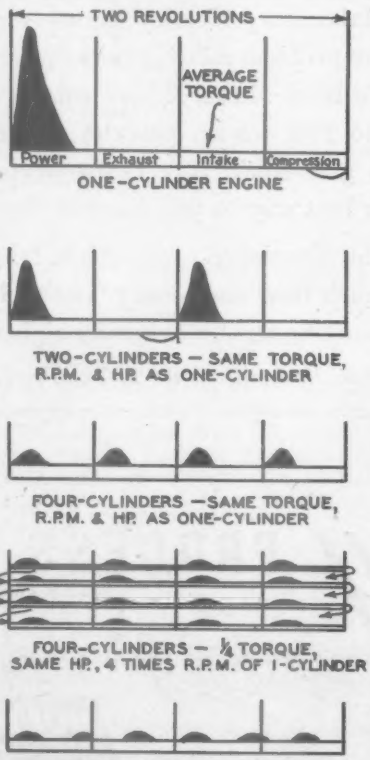
TWO REVOLUTIONS
AVERAGE TORQUE
Power
Exhaust
Intake
Compression
ONE-CYLINDER ENGINE
TWO-CYLINDERS — SAME TORQUE, R.P.M. & HP. AS ONE-CYLINDER
FOUR-CYLINDERS —SAME TORQUE, R.P.M. & HP. AS ONE-CYLINDER
FOUR-CYLINDERS — ¼ TORQUE, SAME HP., 4 TIMES R.P.M. OF 1-CYLINDER
6 CYLINDERS - SAME TORQUE, R.P.M. & HP. AS ONE-CYLINDER

Fig. 1—Gas-pressure power-impulse diagrams for four-cycle carburetor engines

Flywheel Energy

Some energy is necessary to drive the piston of the engine during its exhaust, intake and compression strokes. This energy must also be produced during the power stroke and stored in the flywheel. The amount will vary with the type of engine, compression ratio, inertia forces, load factor and speed. For a one-cylinder four-cycle carburetor engine with a load factor of not less than 65 per cent, an ample allowance should be 15,500 hp./N foot-pounds. The power impulse (P.I.) flywheel burden then becomes 49,500 hp./N + 15,500 hp./N. That is:

Approx. P.I. flywheel burden, ft.-lb. (one-cylinder, four-cycle engine)

$$= \frac{65{,}000 \text{ hp.}}{N} \qquad (22)$$

As shown in Fig. 1, the intermediate or overlapping power impulses of multicylinder engines greatly reduce their power impulse flywheel burden. In addition, as further indicated by Formula 21, the size of each power impulse for the same engine horsepower output becomes less in proportion to the increase in speed N and number of cylinders Q.

According to P. M. Heldt's Automotive Engines, "the flywheel capacities required with engines of different numbers of equal sized cylinders for the same degree of regularity of operation compare as follows:

Single-cylinder	100% (Z/Q = 1.00)
Double-cylinder, equally timed	80% (Z/Q = .40)
Four-cylinder	44% (Z/Q = .11)
Six-cylinder	22% (Z/Q = .037)
Eight-cylinder	11% (Z/Q = .014)

Using the letter Z for Heldt's comparative flywheel capacity in decimal per cent corresponding to Q number of engine cylinders, Formula 22 can

*International Harvester Co.

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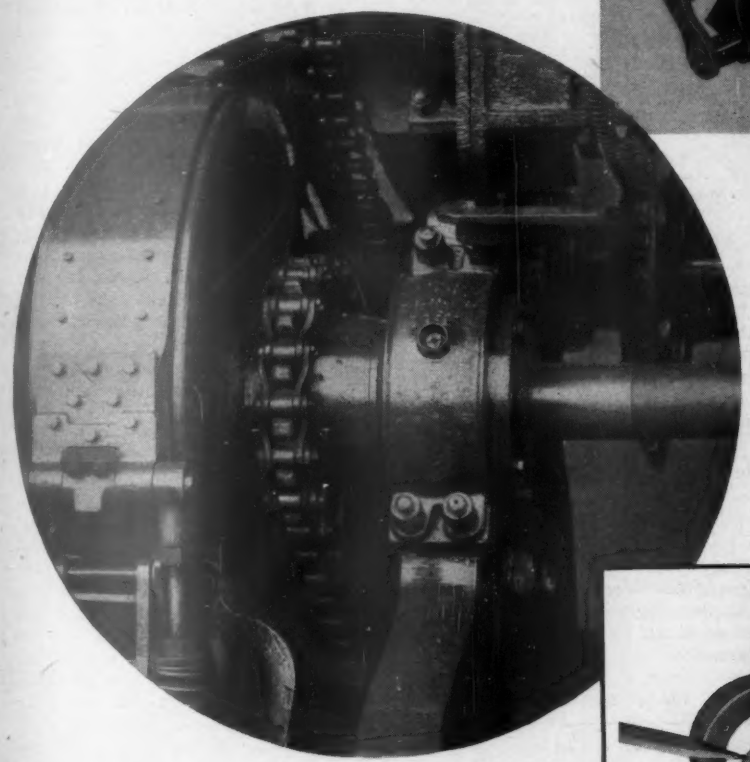

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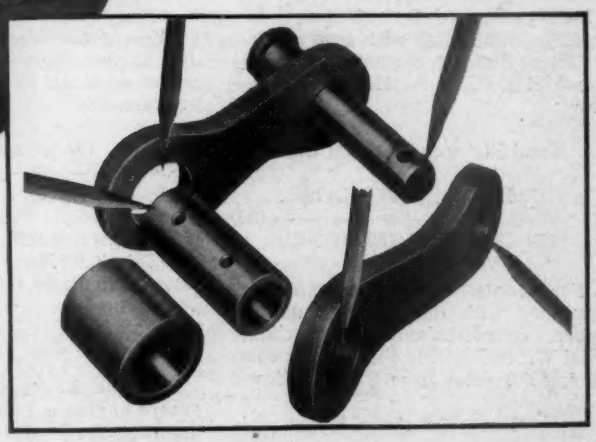

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be expanded to include multicylinder four-cycle carburetor engines as follows:

Approx. P.I. flywheel burden, ft.-lb.

$$= \frac{65{,}000 \text{ hp.}}{N} \times \frac{Z}{Q} \qquad (23)$$

Approximate Engine Power Impulse Flywheel Wr^2

Using the preceding information and the fundamental formula for flywheel energy, the approximate Wr^2 in lb.-ft.^{2} of the flywheel required on a four-cycle engine pulling a uniform load to maintain an instantaneous coefficient of speed fluctuation C′, equal to $N_1' - N_2'/N$, at the flywheel can be roughly estimated as follows:

$$\frac{65{,}000\,(Z/Q) \text{ hp.}}{N} = \frac{Wr^2\,(N_1' - N_2')2N}{5{,}870}$$

$$\text{Instantaneous } C' = \frac{N_1' - N_2'}{N}$$

$$= \frac{190\,(Z/Q) \text{ hp.}}{(N/100)^2\ Wr^2} \qquad (24)$$

$$\text{Approx. P.I. } Wr^2 = \frac{190\,(Z/Q) \text{ hp.}}{(N/100)^2\ C'} \qquad (25)$$

As previously shown, however, single oil-well pumping is not a uniform load. Approximate total Wr^2 required to maintain an over-all coefficient of speed fluctuation at the engine flywheel of C + C′ for single-well pumping rigs with conventional counterbalancing can be obtained by combining Formulas 11 and 25 as follows:

Total Wr^2 (conventional C.B.)

$$= \frac{1{,}240\ FR}{(C+C')N^2} + \frac{190\,(Z/Q) \text{ hp.}}{(N/100)^3\,(C+C')} \qquad (26)$$

For single oil-well pumping rigs equipped with the proposed double-speed counterbalance, approximate total Wr^2 required is obtained by combining Formulas 20 and 25 as follows:

Total Wr^2 (2:1 C.B.)

$$= \frac{160\ FR}{(C+C')N^2} + \frac{190\,(Z/Q) \text{ hp.}}{(N/100)^3\,(C+C')} \qquad (27)$$

Formulas 26 and 27 are mainly for use with single-cylinder and slow-speed engines where the fluctuations in flywheel speed due to the engine's own power impulses can be measured with a good tachometer.

Instantaneous speed variations at the flywheel of heavy-duty power units for four or more cylinders operating at 900 r.p.m. or higher cannot be measured without special laboratory instruments. If C′ is 0.015 or less the small speed variations should be readily absorbed in the V-belt drive and therefore have no effect on speed fluctuation at the speed reducer or pump crankshaft.

Example 1.—Estimate the Wr^2 required for the flywheel of a single-cylinder four-cycle engine developing 20 hp. at 200 r.p.m. pulling a single oil-well pumping rig with conventional counterbalancing at 20 s.p.m. to maintain an over-all speed variation within 6 per cent.

Solution.—Hp. = 20; Z/Q = 1.00; N = 200; s.p.m. = 20; C + C′ = 0.06; FR from Formula 3 = 20 × 8,250/20 = 8,250 lb.-ft.

Total Wr^2, from Formula 26

$$= \frac{1{,}240 \times 8{,}250}{0.06 \times 200^2} + \frac{190 \times 1.00 \times 20}{(200/100)^3 \times 0.06}$$

$$= 4{,}262 + 7{,}916 = 12{,}178 \text{ lb.-ft.}^2$$

This means that two flywheels each weighing about 1,000 lb. with a radius (to the center of gravity of the rim) of approximately 2.5 ft. would be required.

Estimated speed fluctuation C resulting from the load variations in the pumping cycle is obtained by Formula 10 as follows:

$$C = 1{,}240 \times 8{,}250/12{,}178 \times 200^2 = 0.021$$

The estimated speed fluctuation C′ due to the engine's own power impulses as given by Formula 24 is approximately:

$$C' = \frac{190 \times 1.00 \times 20}{(200/100)^2 \times 12{,}178} = 0.039$$

Total measurable variation C + C′ = 0.021 + 0.039, or 0.06 as required. Note particularly that the measurable power impulse speed fluctuation C′ is greater than the speed fluctuation C due to the well load.

Example 2.—Same as Example 1, except engine is four-cylinder operating at 1,200 r.p.m., and oil-well pumping rig is equipped with a double-speed counterbalance.

Solution.—Z/Q = 0.11; N = 1,200; C + C′ = 0.06.

Total Wr^2 from Formula 27

$$= \frac{160 \times 8{,}250}{0.06 \times 1{,}200^2} + \frac{190 \times 0.11 \times 20}{(1{,}200/100)^2 \times 0.06}$$

$$= 15.3 + 4.0 = 19.3 \text{ lb.-ft.}^2$$

Speed fluctuation C due to the well load alone, from Formula 19, is approximately:

$$C = 160 \times 8{,}250/19.3 \times 1{,}200^2 = 0.0475$$

The estimated flywheel-speed fluctuation C′ which could not be measured with an ordinary tachometer (since with 4/2 impulses per revolution it would occur at the rate of 2 × 1,200 r.p.m. or 2,400 times per minute), is given approximately by Formula 24 as follows:

$$C' = \frac{190 \times 0.11 \times 20}{(1{,}200/100)^2 \times 19.3} = 0.0125$$

If C is taken as 0.04 in Formula 20, the estimated flywheel Wr^2 would become 160 × 8,250/0.04 × 1,200^2 or 24.3 lb.-ft.,^{2} and C′ would decrease to 0.0099. Most heavy-duty four-cylinder power units with an A.P.I. continuous duty rating of 20 hp. (65 per cent of maximum) at 1,200 r.p.m., will come regularly equipped with a flywheel, clutch and power takeoff with a moment of inertia of more than 24.3 lb.-ft.^{2} If necessary, considerable effective Wr^2 could be added in the drive pulley. Also, the speed reducer pulley, gears and heavy revolving counterweights have a great deal of Wr^2 which provides a large factor of safety for taking care of load variations deviating considerably from the theoretical.

Conclusion

For four or six-cylinder power units running at the revolutions per minute recommended by the engine manufacturer, it is evident that the small instantaneous speed fluctuations, due to the engine's own power impulses, can be ignored. Also, that flywheel Wr^2 calculations can be greatly simplified by adopting a recommended speed coefficient C for use in Formulas 11 and 20. Further, the proposed double-speed counterbalance should make use of costly special flywheels on multicylinder oil-field power units unnecessary, in addition to improving the over-all operating economy of the pumping rig.

Uses of Vermiculite

VERMICULITE is an interesting mineral which has been used principally in the oil industry as insulation for boilers. When so used it is in its expanded form. The oil industry may find use for it as a lightweight aggregate in concrete and for prefabricated boards for building purposes. It also may be used as a fireproofing material, a lubricating agent in automobiles, a filtering medium for gasoline. In case one has insufficient aluminum paint to cover a surface, finely divided vermiculite can be used as an extender to increase the coverage about 25 per cent.

OPERATING IDEAS

Steps Installed Over Rig Drive

GETTING from the driller's to the rotary side of a rotary drilling rig is often difficult or impossible without walking around either the draw works or the pump. This move has to be made rather frequently and the work of the men is facilitated if some means, such as that shown in the accompanying photograph, is provided for getting over the compounding mechanism. The chains in this case are completely enclosed but the chain guard is the high point between the engines and there is always danger of slipping and being injured while climbing over it. The steps and handrail are a complete unit and they rest on both the engine-shed floor and the engine-framing skid. They are easily installed.

Brace for Extensions

EXTENSIONS of the stems on blowout preventers and valves, so the control wheels are located alongside instead of under the derrick, must have some type of support. A few operators use rather makeshift arrangements which are subject to collapse at a critical moment but most companies insist on a rigging which will be sure to perform satisfactorily. The picture shows the method used by one operator. It consists of a 3-in. pipe welded to the substructure angle irons and having a 2-in. upright and a 2-in. drop with eyes for insertion of the valve-stem extensions.

Blocks Remove Load From Tires

PORTABLE rigs are blocked up while drilling so that there is no load on the springs or tires. This is necessary as the load placed on the derrick is far greater than either the tires or springs were designed to withstand. The tires and springs are intended to be used only when the rig is actually being moved over the road and not while the rig is standing idle in the yard. One operator owning several of the large core-drill rigs, which are used for drilling producing wells, always removes the load from the tires and springs if the rig is to be idle for any length of time. This is done by cribbing up under the frame in a manner similar to that used when preparing to drill. Boards placed under the tires prevent contact with the ground and consequent deterioration.

Poor-Boy Holddown

SHALLOW oil-producing properties are quite often stripper operations which must be carried on with a minimum of expenditure if the lease is to show a profit. For this reason much of the equipment is fashioned and built on the lease. The accompanying photograph shows a holddown for a rod line in a shallow field in North Central Texas. It is made entirely from junk pipe with the exception of the roller which is made from a 2-in. nipple and two 2-in. collars.

QUESTIONS on TECHNOLOGY

by W. L. Nelson

Amount of Steam Required For Stripping

Should stripping trays be placed between the feed line to a bubble tower to strip the product and if so what type of tray and how many should be used?—A. F. D.

If the heaviest or bottom product of a tower is to have a relatively high flash point, it must be stripped and plates must be used below the feed plate. If the material is simply introduced into the bottom of the tower without steam stripping plates, the amount of steam required to obtain even a poor flash point is large. This is indicated in Table 1 under the heading of "one plate," amounts to 0.2 to 0.84 lb. steam per gallon being required for even a fair degree of stripping and enormous amounts to obtain high flash points.

Obviously, the best type of equilibrium contactor or plate should be used, that is, a bubble plate. If, however, the stripping plates must be homemade, perhaps side-to-side plates may be justified. The larger the number of trays, the smaller the amount of steam that is required as shown in Table 1 and also in Figs. 1 and 2. The efficiency of side-to-side flat trays is only half of that of regular bubble trays and hence it will be necessary to use about twice as many side-to-side trays as regular bubble trays.

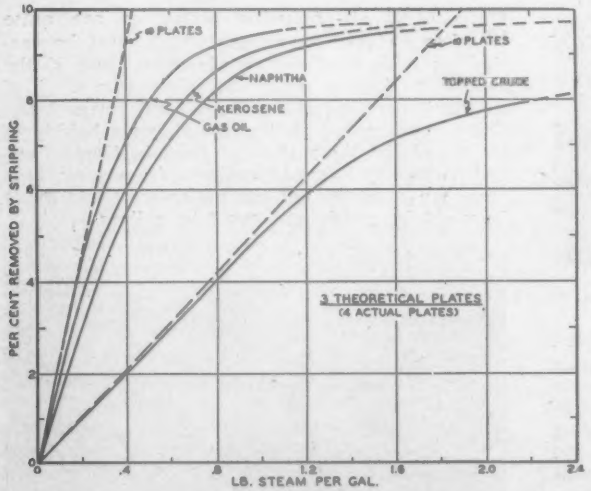
The exact number of stripping trays that should be employed is an economic consideration. For regular degrees of stripping or to moderate flash points, it would seem that three theoretical plates (or about four bubble trays) should be employed. For special products of high flash point, the use of eight theoretical plates (or 10 bubble trays) would appear to be justified. It will be noted from Table 1 and Figs. 1 and 2, however, that an infinite number of trays does not give a materially better flash point than the 4 to 10 trays recommended herein.

Determination of Amount of Steam

In the remaining part of this dis-

TABLE 1—STEAM REQUIRED FOR STRIPPING (POUNDS PER GALLON)

Per cent removed—	1	3	5	8	9	9.5
For one theoretical plate:						
Naphtha	0.07	0.29	0.66	2.33	....	....
Kerosene	0.06	0.25	0.57	2.0	....	....
Gas oil	0.05	0.19	0.44	1.53	....	....
Topped crude	0.21	0.84	1.9	6.7	....	....
For three theoretical plates (about four actual plates):						
Naphtha	0.07	0.20	0.35	0.76	1.08	1.8
Kerosene	0.06	0.17	0.30	0.66	0.93	1.37
Gas oil	0.04	0.13	0.23	0.50	0.71	1.05
Topped crude	0.20	0.60	1.0	2.19	3.1	....
For five theoretical plates (about six actual plates):						
Naphtha	0.07	0.20	0.34	0.61	0.80	1.01
Kerosene	0.06	0.17	0.29	0.53	0.69	0.87
Gas oil	0.04	0.13	0.22	0.40	0.52	0.67
Topped crude	0.20	0.60	0.97	1.75	2.28	2.9
For eight theoretical plates (about ten actual plates):						
Naphtha	0.07	0.20	0.33	0.56	0.69	0.80
Kerosene	0.06	0.17	0.29	0.49	0.60	0.77
Gas oil	0.04	0.13	0.22	0.37	0.46	0.59
Topped crude	0.20	0.60	0.95	1.62	1.98	2.57
For infinite theoretical plates:						
Naphtha	0.07	0.20	0.33	0.53	0.60	0.63
Kerosene	0.06	0.17	0.28	0.46	0.51	0.54
Gas oil	0.04	0.13	0.22	0.35	0.39	0.41
Topped crude	0.20	0.60	0.95	1.52	1.71	1.81



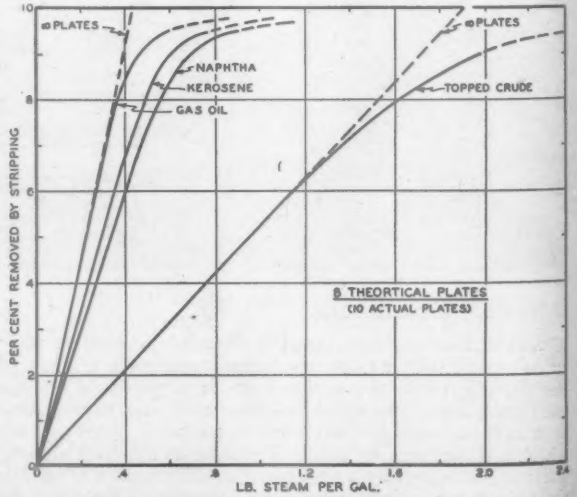


Fig. 1 (left): Amount of steam (approximate) required for stripping when using four bubble plates. Fig. 2 (right): Amount of steam (approximate) required for stripping when using 10 bubble plates

cussion, an appropriate method of estimating the amount of steam required is given by means of tabulations or charts. At the best, such computations can be no better than approximations, and hence, it is suggested that the figures given herein be used in a comparative way, rather than for exact design calculations.

Two Relationships

Two relationships are presented, first an approximate relationship between flash point and the front end (0 to 10 per cent) of the distillation curve of the material, and second, an approximate relationship between amount of steam (also number of plates) and the amount of material (0 to 10 per cent) removed by the stripping.

The approximate relation between flash point and the front end of the distillation curve of the material is given by the equation:

$$F = 0.64\,T - 100$$

in which F is flash point and T is the boiling range (°F.), of the material in the range of 0 to 10 per cent distilled. This is shown graphically in Fig. 3. It will be noted that the kind

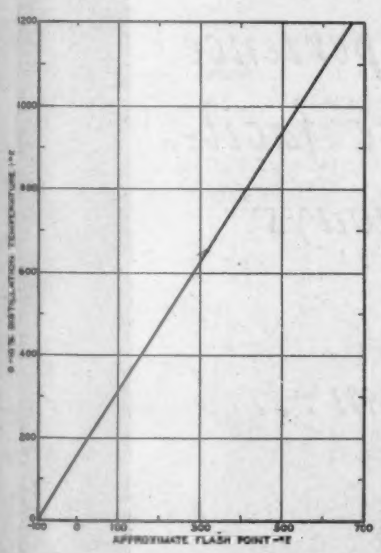


Fig. 3: Flash point versus temperature of front end of distillation curve (approximate)

of flash point is not mentioned. The equation is probably not accurate enough to differentiate between different kinds of flash points, although it was determined by the use of Tag data in the lower ranges and Cleveland data in the upper ranges.

The amounts of steam required, as shown in Table 1 and Figs. 1 and 2, were computed by means of the stripping formulations given on pages 558-561 of the second edition of Petroleum Refinery Engineering. It was assumed that the first portion of the material, that from 0 to 10 per cent on the distillation curve, is the part that is removed by stripping. Thus, when about 10 per cent of the material has been removed by stripping, little more can be accomplished. In fact, the product can be improved more easily by adjustment of its composition in the main tower, than by more stripping with steam.

Method Devised for Flanging Steel Sheets in Refinery Boiler Shop

FREQUENTLY in fabricating or repairing equipment in the shop, it is necessary to bend sides, ends, or edges uniformly to produce a flange at right or any other angle to the sheet. Forge bending of this flange is slow and very expensive. Equipped with a heavy, three-roll press for rolling curved sheets Standard Oil Co. of Indiana's boiler-shop staff worked out the following method for accomplishing this bending.

A jig is made, consisting of a strip of 1-in. steel plate about 12 in. wide by the desired length, and the plate is curved to fit one of the lower rolls in the sheet rolling press. One-inch holes are drilled at intervals along each long edge of the strip, to receive screw bolts; the face of the lower roll is drilled and tapped for these bolts. Two steel strips, as long as the jig base, 3 in. wide and ½ in. or more thick are welded down the central element of the jig base and forming a slot between them of the required width, ½ in. or more or less, depending on the thickness of the sheet to be flanged. This assembled jig is bolted to the lower roll of the mill, with these slot strips outward.

In the flanging operation, the upper or third roll of the sheet-rolling press is raised until the bolted-on jig on the lower roll clears when the press is rotated. The press is rotated until the jig is on the outside, and the edge of the sheet to be flanged is inserted into the slot. The press then is rotated slowly, the upper roll contacting the sheet as the latter approaches the upper roll, and the body of the sheet is bent backward as the rolls continue to rotate the jig forward. The angle at which the flange is formed is determined by the distance through which the press is rotated, and rotation is stopped when the desired angle is obtained. For example, where replacing sheets in the bottom of gondola (railroad) cars, it is necessary to right-angle flange these sheets in order to bolt them to the gondola sides, a job which can be done with this arrangement. Necessarily within reasonable limits the width or depth of the flange slot can be provided as desired.

Since 1922, we have specialized in the production of Refinery Return Bends and **FAHRITE** *Heat Resisting Alloy Tube supports.*

Our experience and complete facilities are always available.

Use them... frequently.

THE OHIO STEEL FOUNDRY COMPANY

LIMA AND SPRINGFIELD, OHIO

ENGINEERS • FOUNDERS • MACHINISTS

FREE ENTERPRISE IS THE ONLY WAY TO CONSTANTLY HIGHER AMERICAN LIVING STANDARDS

Engineering Fundamentals No. 127

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

MEASURING FILTER PROPERTIES AT HIGH PRESSURES AND TEMPERATURES

IN many wells drilled with a rotary rig to extreme depths, the temperature of the mud may be 200° F. or more, and the differential pressure acting to induce filtration (i.e., the amount by which the pressure of the mud column exceeds the formation pressure) may be several hundred pounds per square inch. For exact evaluation of the wall-building property, the filter test should be made at the temperature and differential pressure existing in the well under consideration.

Apparatus available for making the wall-building test at elevated temperatures and pressures is illustrated in Fig. 1. The apparatus is designed to withstand pressures up to 1,000 lb. per sq. in. and has a temperature contral up to 212° F. Referring to Fig. 1,* the apparatus consists essentially of a filter cell fitted into a constant-temperature bath and mounted to a screw-press frame. A small hydraulic pump is provided for applying water pressure to the mud. A water reservoir is attached to the press frame and connected to the suction of the pump. A check valve, a 1,500-lb. pressure gage, and a bleeder valve are provided on the pump discharge line, which is connected into the top of the mud container.

The pressure filter cell consists of a mud cylinder with top and bottom caps, screen, rubber gasket, and filter paper. The top cap is fitted with a thermometer well. The bottom cap is threaded internally to fit the mud cylinder, threaded externally to fit the bath, and has a small opening in the center to allow passage of filtrate through the filtrate tube into the graduated cylinder. The filter cell has a capacity of about 285 cc. and has an effective filtering area of 3.5 sq. in. Since the filter area of the low-pressure wall-building tester† is 7.07 sq. in., the water loss from the high-pressure tester with a given mud at a given pressure and temperature should be about half that obtained with the low-pressure tester.

*Courtesy Baroid Sales Department, National Lead Co.

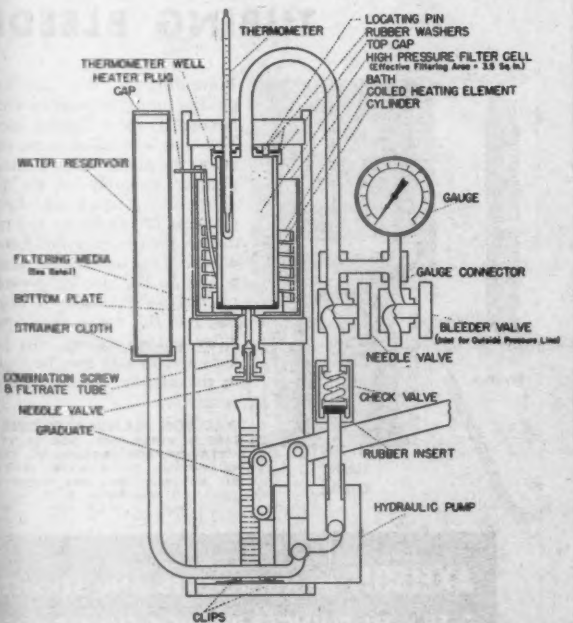


Fig. 1

A 450-watt electric coiled heating element is provided in the water bath. Current may be turned off or on as necessary to control the temperature.

The bleeder valve on the pump discharge line may be used not only for relieving the pressure when a test run is completed but also for connecting an outside pressure line if desired.

In using the apparatus, the screen is placed in the botton cap, a filter paper is placed on the screen, and a rubber gasket on the filter paper. The cap is screwed to the mud cylinder and then to the bath. The cell is filled to within ¼ in. of the top with mud. The top cap is put in place without spilling any mud on the top rim of the mud cylinder.

The filter cell and bath assembly is then centered between the cross members of the press and the filtrate tube screwed up while guiding the top of the cylinder to engage the pressure inlet tube. The filtrate tube is finally tightened with a wrench. Leakage of filtrate prior to the test is prevented by the needle valve at the bottom of the filtrate tube.

The thermometer is placed in the well, the bath is filled with water and heat applied by plugging into an electric circuit. During the heating, the needle valve on the pump discharge line should be closed to prevent mud from getting in the check valve, and the bleeder valve should be open to avoid building up any pressure. When the mud reaches the desired temperature, the graduated cylinder is placed below the filtrate tube and secured with the clips. The bleeder valve is closed and the needle valve on the pump discharge line opened. The water reservoir is filled and the hydraulic pump operated until the desired pressure is obtained. The test run is then started by opening the needle valve at this point. During the test, the pump is operated to maintain a constant pressure.

At the end of the test the valve in the filtrate tube is closed, the bleeder valve opened, the thermometer removed, and the filter cell dismantled to recover the filter cake. The thickness of the cake is measured as already described in connection with the low-pressure test.

In order to get best results, by being able to correct for initial filtration (occurring before timing starts), it is recommended that test runs be at least 1 hour in length. Convenient times for reading the filtrate volume during a run are at the end of 5, 10, 15, 30, 45 and 60 minutes.

Note: Credit is due to the Baroid Sales Department of National Lead Co. for furnishing information used in the preparation of this discussion.

†See Installment 126.

Series prepared by Glenn M. Stearns, associate professor of petroleum engineering, University of Oklahoma

HOLD PRESSURE STEADY...

when supplying or exhausting gases with

STURTEVANT CENTRIFUGAL COMPRESSORS

Here's the equipment that can boost efficiency wherever you're handling gases—and make valuable power savings in the bargain. Delivering to absorbers, condensers and burners... exhausting from absorbers, accumulators and stills... these are but a few of the jobs where performance and economy features of this Sturtevant High Pressure Fan are used to advantage:

POWER SAVINGS—whether motor or turbine driven, power requirements vary in proportion to the volume of gas handled.

CONSTANT PRESSURE—every unit will handle a wide range of volumes, all at constant pressure, without adjustment of any kind.

LIFETIME EFFICIENCY—heavy steel construction without close clearances means longer life, no drop in efficiency.

MINIMUM MAINTENANCE—bearings are the only moving parts in contact; only attention required is occasional lubrication.

QUIET OPERATION—vibration eliminated by complete static and dynamic balance of rotating parts. For equal peripheral speeds it is the quietest unit built.

OVER 200 SIZES—Select the capacity and pressure rating best suited to your requirements; ½ to 5 lb. pressure, volumes to 60,000 cfm.

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Puts Air to Work

PUMPS
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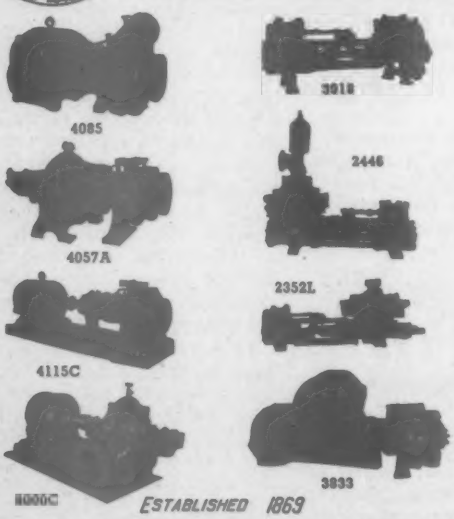
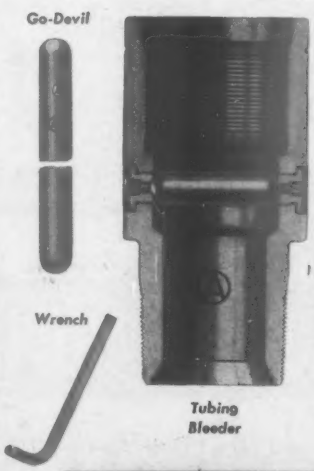


ESTABLISHED 1869

DEAN BROTHERS PUMPS INC.
INDIANAPOLIS IND.
323 W TENTH ST.

MINIMIZE "WET JOBS" BY RUNNING AN AXELSON TUBING BLEEDER



Preventing a "Wet Job" when pulling tubing is possible with the famous Axelson Tubing Bleeder. This unit is installed in the tubing below the pump. After pulling the plunger assembly or the pump (depending upon whether the pump is of tubing or rod type), the go-devil is dropped down the tubing. This unseats the plug assembly in the bleeder, *permitting the fluid in the tubing to flow out through the holes thus opened.* After pulling tubing, the plugs, seats and gaskets may be replaced in the bleeder quickly and inexpensively.

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6160 S. BOYLE AVE., BOX 98 VERNON STATION, LOS ANGELES 11, CALIF.
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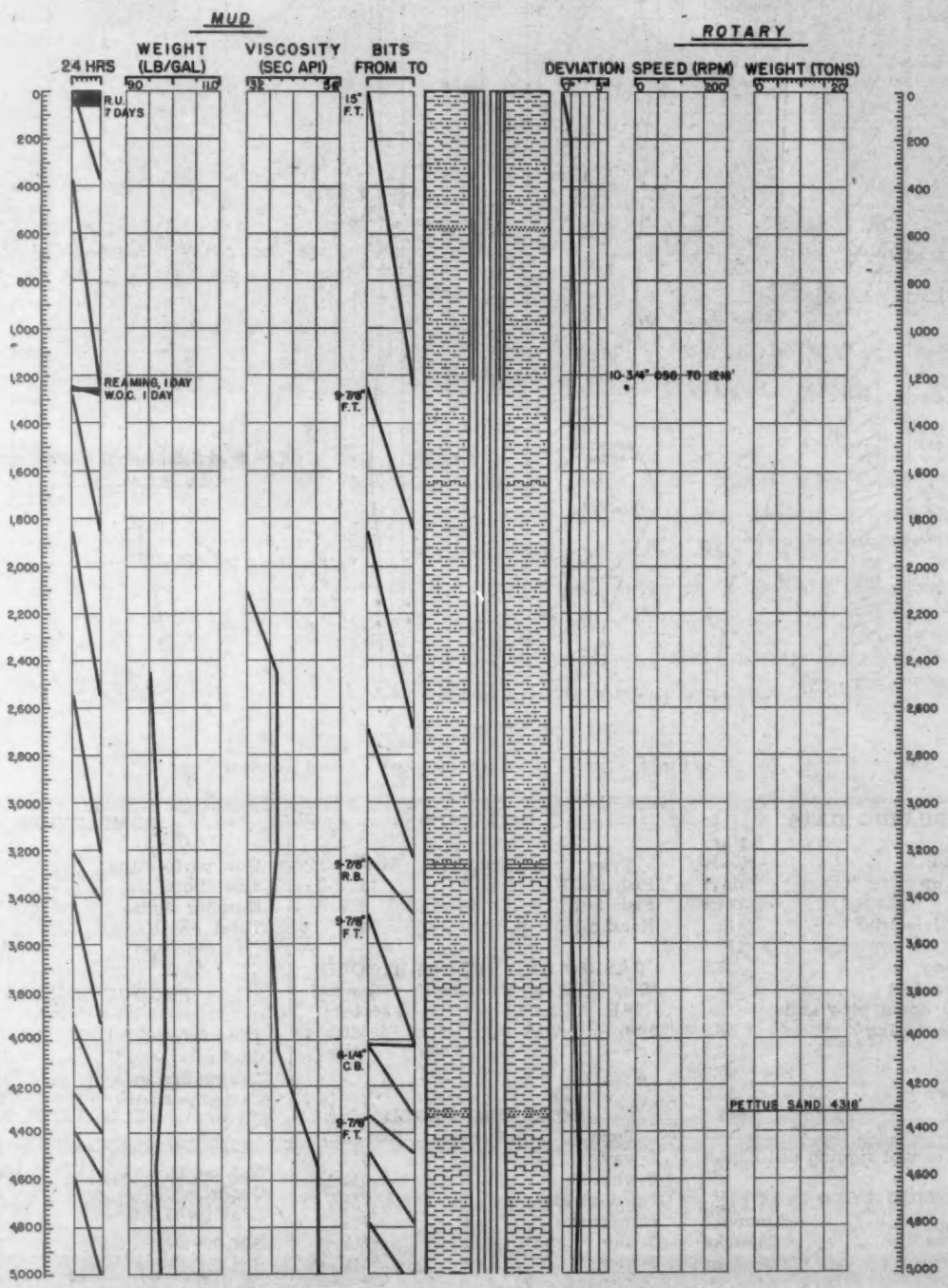
AXELSON MANUFACTURES AND SERVICES
DEEP WELL PLUNGER PUMPS & SUCKER RODS

Discovery Well, Wilcox Production, Slick Field, Goliad and DeWitt Counties, Texas

CONTINENTAL OIL CO. 1 ALDA S. WOOD — **CONTRACTOR**

C.E.P.I.&M. Co. Sur., elevation 341 ft., derrick floor

Fain Drilling Co.



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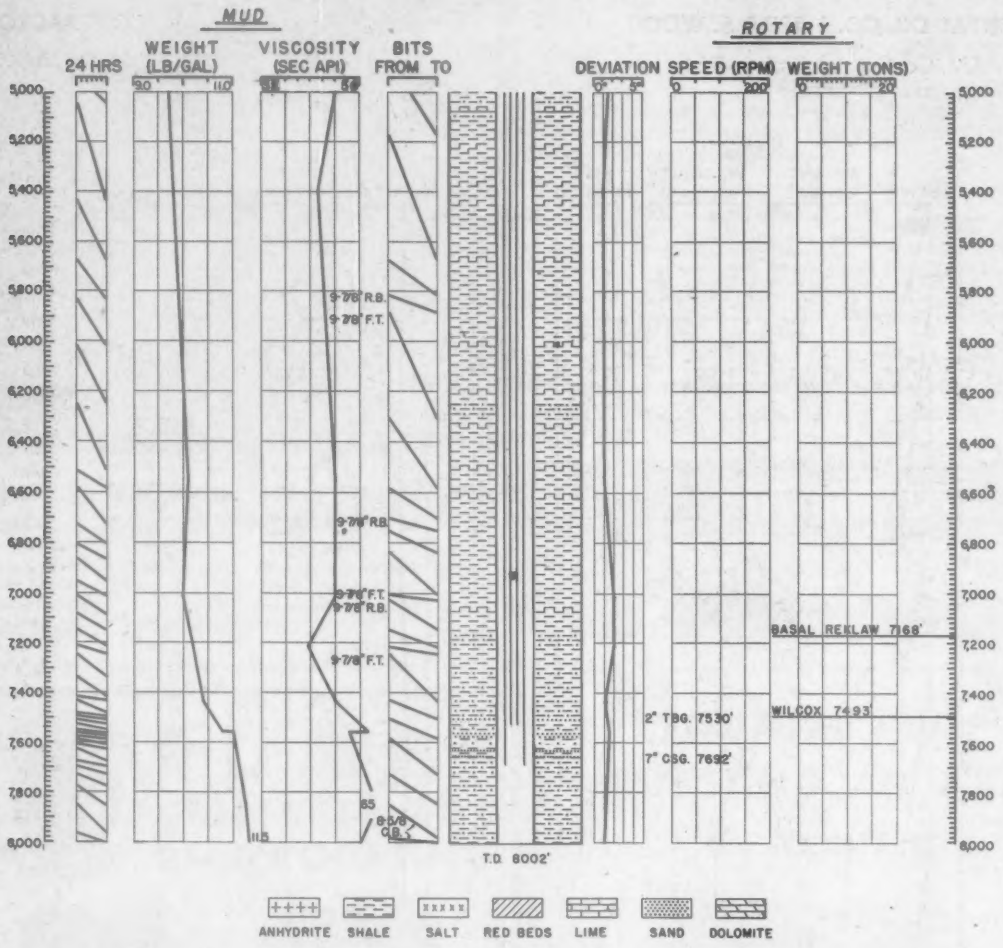
Journalog

Discovery Well, Wilcox Production, Slick Field, Goliad and De Witt Counties (Continued)



DRILLING DATA

Type rig	Rotary
Time record:	Hours
Rigging up	7 days
W.O.C.	144.5
Logging (electric)	13
Coring	211
Circulating	36.5
Drill-stem test	31
Breaking down pipe and running casing	56.5
Trips	176.5
Repairs	60.5
Shut down	53.5
Drilling	545
Total (except rigging up)	1,328.0

MUD USED

Type	Amount
Aquagel	25 sacks
Baroid	883 sacks

BITS USED

Type	Number	Size (in.)
Fish tail	1	15
Fish tail	19	9⅞
Rock bit	7	9⅞

CASING AND TUBING RECORD

Size (in.)	Weight (lb.-ft.)	Depth (ft.)	Cement (sacks)
10¾	40.5	1,218	800
7	26.0	7,692	350
2	4.7	7,530	

CORE HEADS USED

Type	Number	Size (in.)
3-way	1	6¼
3-way	3	6¾
Hard head	1	7¾
Hard head	4	7¼
3-way	1	7¼
3-way	2	8⅛

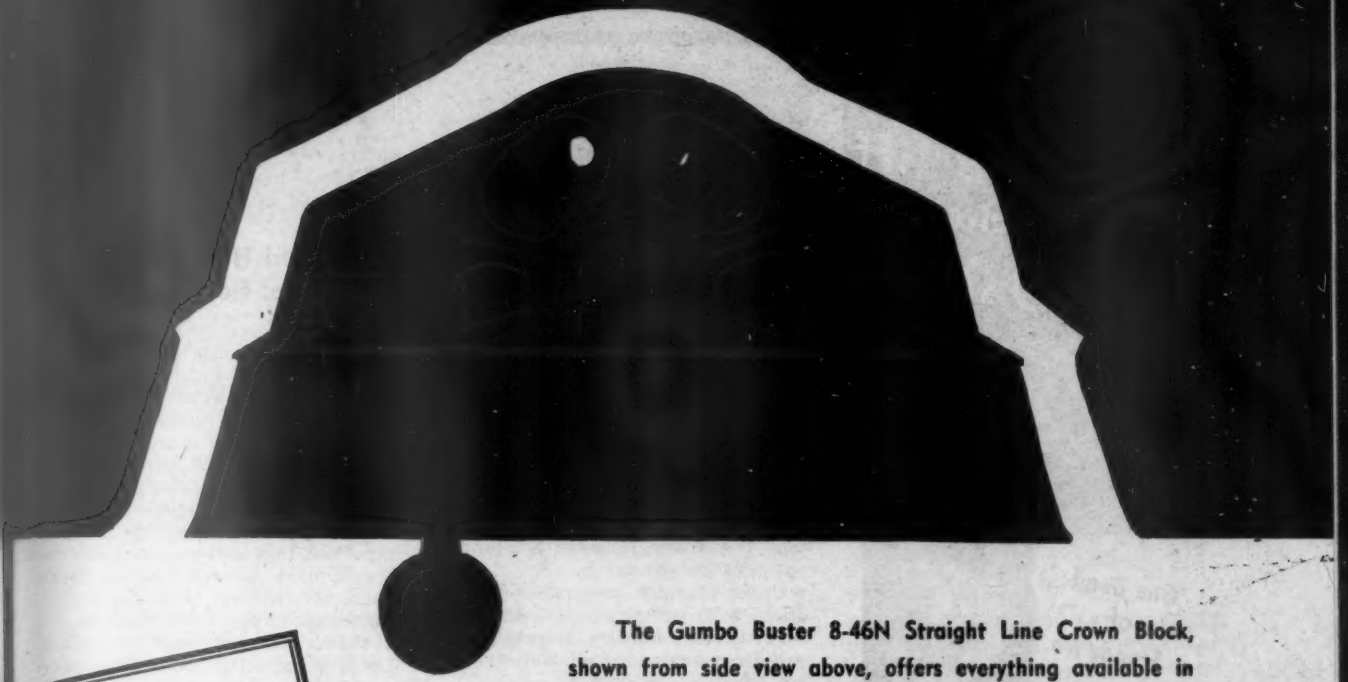
COMPLETION

Gun perforating	7,600-20 ft.
Size shots	½-in.
Number shots	48
Total depth	7,640 ft.

PRODUCTION TEST

Time flowed	24 hr.
Choke	10/64-in.
Tubing pressure	1,075 lb.
Casing pressure	1,425 lb.
Oil	230 bbl.
Water	none
Gas, cu. ft.	100,000
Gas-oil ratio	439:1
Gravity, A.P.I.	36.4
B.H.P.	3,000 lb.
B.H.T.	210° F.

CROWN BLOCKS
by Gumbo Buster



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NAVY
We proudly fly this flag for excellence in production for Uncle Sam—and the White Star for a continuance of the good work.

The Gumbo Buster 8-46N Straight Line Crown Block, shown from side view above, offers everything available in crown blocks today for modern, deep well drilling. Behind this block is nearly a half century of research, designing, building and improving of rotary drilling equipment.

Gumbo Buster Crown Blocks are made in sizes to match every drilling load. Specifications below tell the full story. Prices quoted upon request.

Block Name	534-30	7-36	8-36	8-46N
For Complete Details Ask for	Bulletin 27	Bulletin 26	Bulletin 25	Bulletin 29
Capacity	80 Tons	125 Tons	200 Tons	300 Tons
Weight—4 Sheave	2270 lbs.	2700 lbs.	4650 lbs.	.....
5 Sheave	2550 lbs.	3300 lbs.	4700 lbs.	.....
6 Sheave	.....	.....	4750 lbs.	5000 lbs.
Length	7' 6"	7' 6"	7' 6"	7' 6"
Width—4 Sheave	28"	30"	49"	.....
5 Sheave	31"	34½"	49"	.....
6 Sheave	.....	38½"	49"	46¾"
Center Pins—Hardened and Ground	Single 5¾" dia.	Single 7" dia.	Double 8" dia.	Single 8" dia.
Sheaves	30" CHNI Steel	36" CHNI Steel	36" MN Steel	46" MN Steel
Bearings	Straight Roller	Straight Roller	Straight Roller	Straight Roller
Boxes	Cast Steel	Cast Steel	Cast Steel	Cast Steel
Beams	2 70 lb I Beams	2 70 lb I Beams	4 58 lb Channel	2 70 lb I Beams
Lubrication—To each Sheave, through Center Pin	Alemite	Alemite	Alemite	Alemite
Catline Sheave Attachment	Optional	Optional	Optional	Optional
Sand Line Sheave Attachment	.....	.....	.....	Optional

YEARS OF MANUFACTURING ROTARY DRILLING EQUIPMENT

THE AMERICAN WELL & PROSPECTING CO.

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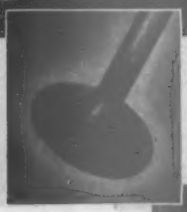

⇦ One Scrapped Exhaust Valve

One Bead ⇨ of Stoody 6

⇦ One Regrind on Deposit

...and you have a reclaimed valve with three to four times the life of a new factory replacement at ¼ the cost.

This folder outlines the simple procedure any garage or shop equipped with acetylene welding equipment can follow. Eliminate your worries about valve replacements and save money as well. Write for folder "Weld New Life onto Worn Valves with Stoody 6—no obligation.

STOODY COMPANY
1138 W. SLAUSON, WHITTIER, CALIF.

STOODY 6 · THE METAL THAT ADDS EXTRA MILES TO EXHAUST VALVE LIFE!

REFINING

Refiners Asked to Report Organic-Chemical Volume

WASHINGTON, D. C.—The growing importance of petroleum chemicals is recognized in the inclusion, for the first time, of all petroleum producers in the U. S. Tariff Commission's annual survey of production and sales of organic chemicals.

The survey covers the 1943 calendar year, and includes two sections on petroleum chemicals. "Crudes" and hydrocarbons from petroleum for chemical conversion lists such products as benzenes, toluenes, xylene, cresylic and naphthenic acids, butadiene, n-butane, diisobutylene, ethylene, isobutane, isobutylene, isoheptane, isopentane, propane, polybutane, and triisobutylene.

Under chemical raw materials produced from petroleum, tert-Amylphenol sulfides, Barium isooctylphenol sulfide, cumene, phenol and styrenes are listed among others.

By compiling information in this fashion, the commission will be able to report production and sales of petroleum and coal-tar chemicals more completely, a service of value to both government agencies and individual producers.

Forms have been sent to known producers, and the commission urges any producer who has not received them to write direct to the U. S. Tariff Commission, Washington 25, D. C.

Mexico Refinery May Make Fuel for U. S. Airmen

WASHINGTON, D. C. — Efrain Buenrostro, general manager of Petroleos Mexicanos, and several other Mexican officials are in Washington for conferences with executives of Export-Import Bank and the foreign division of Petroleum Administration for War concerning a plan to convert a refinery at Mexico City to the production of 100-octane gasoline for United States planes.

The group is working out a program which is said to look to management of the refinery by Phillips Petroleum Co. and repressuring operations at the Poza Rica oil field. Cost of the project is to be met by Export-Import Bank with lend-lease funds, and priorities are to be obtained from War Production Board. PAW's part will be that of technical advisor, it is said. The project has no connection with Petroleum Reserves Corp. The aviation gasoline produced at the plant will be used by United States commercial planes.

Army and Navy Intensify Support of Refinery Work

Production of 100-octane gasoline has been proclaimed the No. 1 item of war priorities, taking precedence even over airplanes and ships. Speaking at a recent meeting of California oil executives and Army and Navy officials, Rear Adm. Henry F. Bruns said that although the petroleum industry has stepped up its output to an amazing peak, it is vitally important that still greater quantities be supplied to the fighting fronts where the demand is tremendous.

One reason for this is that the loss of planes has not been as great as was first expected. Combat areas, of course, have first call on available

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Cooperating in the vital problem of expediting 100-octane gasoline production are these men, brought together at a recent meeting attended by Army and Navy officials and executives of oil companies having refineries in California. They are Capt. Hector C. Griswold, U.S.N.R.; L. F. Bayer, vice president, Tide Water Associated Oil Co.; Rear Adm. Henry F. Bruns, Corps of Civil Engineers, U.S.N.; Brig. Gen. Russell E. Randall, commanding general Fourth Fighter Command, Fourth Air Forces, and T. O. Edwards, Jr., superintendent of Associated's Avon refinery where a large catalytic cracking plant is now under construction, for a substantial addition to present 100-octane capacity

100-octane fuel, but this works a hardship on pilots who must, at present, take their training with 91-octane gasoline and then in actual fighting are supplied with 100-octane. An Army authority stated that many engine failures are attributable to the use of 91-octane in motors designed for 100-octane fuel.

Obtaining sufficient manpower is the crux of the problem. Its ramifications include questions of satisfactory housing, transportation, Selective Service demands, labor relations, and production incentives.

By means of meetings, newspaper articles, highway bulletins near plants, and other media, every effort is being made to acquaint those concerned with the urgent need for increased 100-octane production and to obtain the enthusiastic cooperation of every worker in the industry.

WANTED

MECHANICAL ENGINEER

Graduate mechanical engineer with 7-10 years oil refinery engineering experience wanted for development work. Permanent position offered by a long-established AAA-1 company, manufacturing fractionating and pressure vessels, heat exchangers, cast-steel flanged fittings and other equipment for the petroleum and process industries. Knowledge of cast-steel header boxes desirable. Successful applicant will report directly to plant manager. Location in southwestern city where ample housing facilities exist. If you feel qualified for this key position in an expanding organization, apply giving full information and enclosing small photograph. Replies will be held strictly confidential. Maximum salary—$5000 per year.

Box C-183

The Oil and Gas Journal

Tulsa 1, Oklahoma

Louis Rose Puts Sovereign Refinery Into Operation

SAGINAW, Mich.—Refinery facilities of Sovereign Refining Co. has been purchased by the newly organized Louis Rose Refining Co. and test runs have been started. Principal owners of the new company are Louis Rose, oil producer of Detroit, Mich., and John O'Neal, of Big Rapids, Mich., active in exploratory and refining operations.

The plant, of 1,200-bbl. capacity, is a topping unit. It is to be enlarged and improved. O'Neal, who helped organize Osceola Refining Co. at Reed City, Mich., is manager of the new company, with Francis Bacon in charge of plant operations.

Standard of Indiana Buys More Land Near Whiting

Standard Oil Co. (Indiana) last week purchased 260 acres at Whiting, Ind. The property is about two blocks west of Standard of Indiana's present refinery area which covers about 800 acres. The additional space will eventually be used to relieve congestion at the refinery. Detailed plans for its use have not been worked out.

ECOLITE 92BM

WITH LOCKING DEVICE AND SEALS

TWICE APPROVED for DOUBLE SAFETY

APPROVED BY U. S. BUREAU OF MINES UNDERWRITERS' LABORATORIES

—for use in atmospheres containing Methane & natural gas, gasoline or petroleum vapors. This double-safety lantern has a tamper-proof reflector and cover with locking device and seals. Throws 1500 ft. beam. Instantly ejects broken bulbs from battery circuit. Large handle—360° pivoting feature gives direct illumination where needed and leaves both hands free for work.

Now at Supply Stores

ECONOMY ELECTRIC LANTERN CO.

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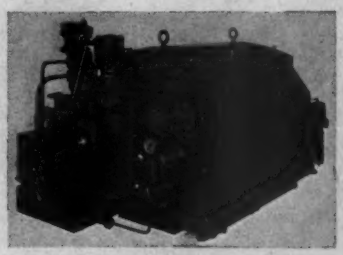
MURRAY

STEAM TURBINES FOR REFINERIES



Type UV turbine with automatic nozzle control. Particularly adapted for boiler feed pump drive or fan drive where best economy is required at partial loads.

MURRAY IRON WORKS COMPANY

BURLINGTON IOWA

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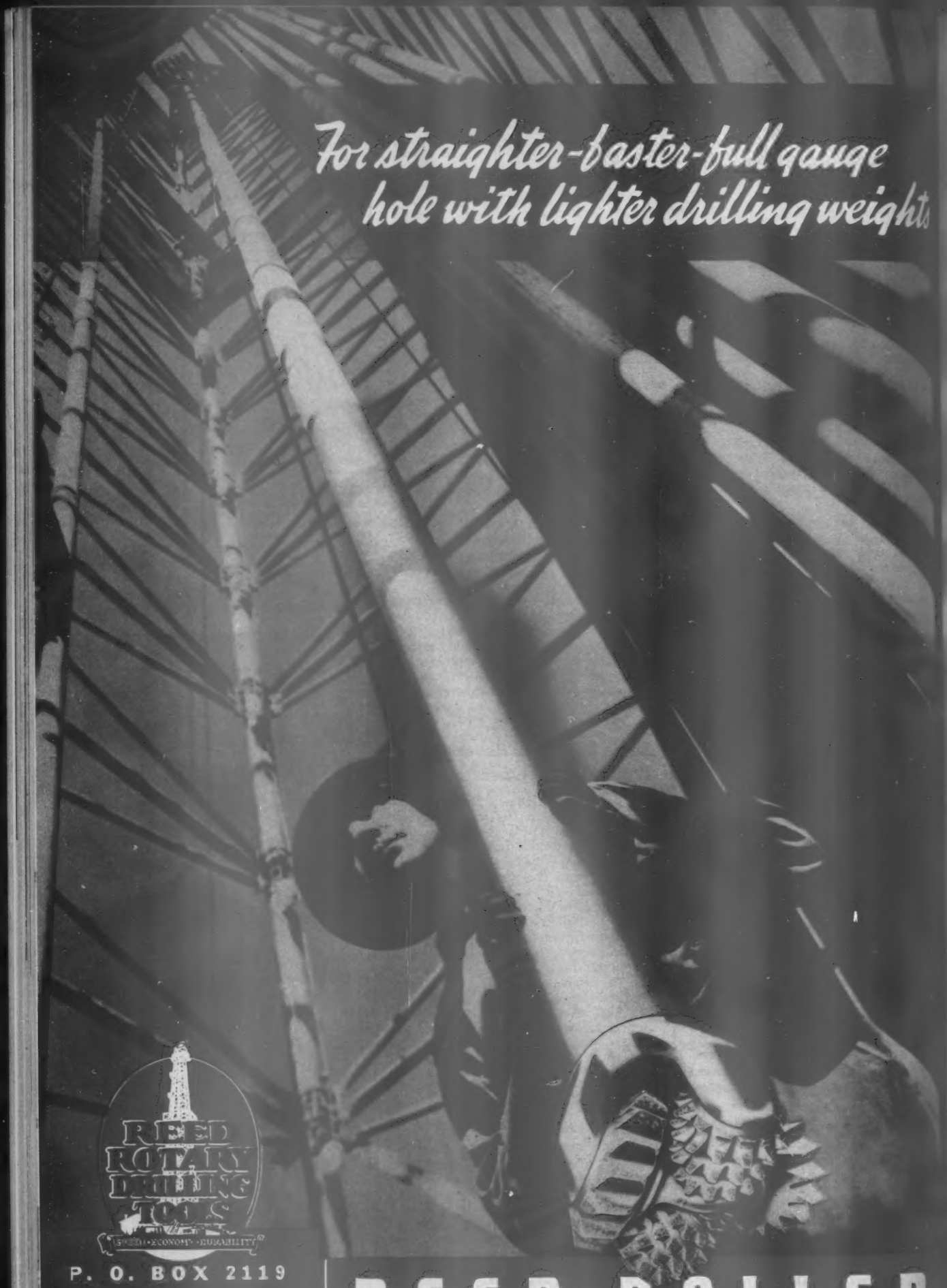
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hole with lighter drilling weights
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HOUSTON 1, TEXAS
REED ROLLER

Natural Gas

American Gas Association Votes Changes in Setup

NEW YORK.—Putting into effect changes in the American Gas Association recently voted by the membership, the executive board at a meeting February 16, in Cleveland, Ohio,, approved detailed plans for setting up a natural-gas department and a manufactured-gas department.

The constitution now provides that each of these departments shall have a vice president of the association as chairman. The vice presidents will serve as ex-officio members of the finance and control committee. J. French Robinson, vice president of the association and president of the East Ohio Gas Co., is chairman of the new natural-gas department. George S. Hawley, president of the Bridgeport Gas Light Co., and past president of the association, is chairman of the manufactured-gas department.

The natural-gas department will be headed by a managing committee with Robinson as chairman. There will also be an advisory committee, a nominating committee and a director of the department. The director will be a full-time employe of the association and will have the additional post of assistant managing director.

Five main departmental committees have been established: Production and storage, transmission, accounting, large-volume sales and technical and research.

The wrinkle and wrinkle award committees have been made general committees of the association as has the committee on vocational education.

"Polythene," New Plastic, Is Derived From Natural Gas

"Polythene," a new plastic of wide usefulness, has been developed from natural gas by du Pont chemists. It is said to possess physical characteristics that will give it a place in the manufacture of toothpaste tubes, wire insulation, waterproof coatings, piping and adhesives. In thin sheets it is flexible without being limp and rubbery, while in thicker shapes it is stiff enough to be classified as a rigid plastic.

Polythene is made by the polymerization, or chemical welding, of large numbers of ethylene molecules. Ethylene is a gas derived from petroleum, natural gas and coal, hence is a cheap, easily obtainable raw material.

Gas Deliveries in Four-State Region Cut 40 Per Cent

CLARKSBURG, W. Va.—A cut of 40 per cent in gas deliveries to consumers in a four-state area was imposed last week by Hope Natural Gas Co., and results of the curtailment were felt almost immediately. L. L. Tonkin, president, said few industries would escape untoward effects of the reduction.

"There was simply a shortage of gas," Tonkin said, adding that there was no way of telling how long the situation would continue and that weather was not a factor.

There has been no limitation on domestic consumers, but Tonkin urged householders to use gas as sparingly as possible. Industries most affected are those classified "No. 6" by the War Production Board. These are concerns not engaged in war work or whose output is only indirectly related to the war effort.

Revenue From Natural Gas Rises Sharply in Texas

AUSTIN, Tex.—The Texas natural-gas production tax yielded $2,701,605 in 1943, an increase of $322,789 over receipts in 1942, according to the report of George H. Sheppard, state comptroller. Greater production and higher prices for gas account for this increase of about 14 per cent.

Contributing heavily was the $653,706 collected from the 35 cycling plants.

Cleveland Seeks Rebate From East Ohio Gas Co.

CLEVELAND, Ohio.—This city has asked the Ohio Public Utilities Commission to approve three short-term gas-rate ordinances and to order the East Ohio Gas Co. to refund to consumers more than $9,000,000 collected under bond for the past 4½ years as the difference between city and company rates, plus interest.

Counsel for the city contended the commission should adopt the lower ordinance rates in the light of a recent U. S. Supreme Court decision directing the Hope Natural Gas Co. of West Virginia, from which East Ohio buys most of its gas, to lower its gas rate at the Ohio State line.

Natural Gas Spring Meeting To Be Held in French Lick

Natural Gas Department, American Gas Association, will sponsor a natural-gas spring conference to be held May 11-13 at French Lick Springs Hotel, French Lick, Ind. The program, not yet completed, is to include a symposium on the storage of natural gas and one on long-distance transmission of natural gas. Speakers will be from sections in which such problems are of particular interest.

Natural Gasoline

Drop Recorded in December Natural-Gasoline Output

WASHINGTON, D. C.—Following a rise of several months which established new highs, the daily average output of natural gasoline and allied products underwent a moderate recession in December, according to U. S. Bureau of Mines, the daily average for the month being 10,565,000 gal., compared with 10,762,000 gal. in November. Production for 1943 increased 6 per cent, with gains of 32 per cent recorded in Illinois, 9 per cent in California, and 7 per cent in Texas. There was a decrease of 5 per cent in Oklahoma.

Total stocks of natural gasoline and allied products fell from 195,090,000 gal. on November 30 to 190,722,000 gal. on December 31. Stocks on December 31, 1942, totaled 194,544,000 gal.

Monthly figures for production of light products in 1943 indicate that liquefied petroleum gases increased 29 per cent, and cycle products 4 per cent, while natural gasoline decreased slightly compared with 1942. Sales of liquefied gases increased more than 10 per cent, and it is probable that chemical uses also increased materially.

PRODUCTION
(Thousands of gallons)

	Dec.	Nov.
Natural gasoline	173,062	173,334
Cycle products	62,496	59,934
Liquefied petroleum gases:		
Isobutane*	16,186	17,346
Other L.P.G.*	73,752	72,340
Liquefied refinery gas	17,178	13,818
Benzol	8,400	8,400
Total production	353,094	345,072

*At natural-gasoline and cycle plants.

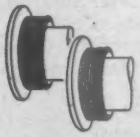
STOODY SELF-HARDENING MAKES THE DIFFERENCE!

ABOVE are two reclaimed rollers taken from the same tractor. The upper roller was rebuilt to size with high carbon electrodes alone, but the lower roller carried a protective layer of Stoody Self-Hardening over the high carbon build-up*.

Abrasive conditions encountered in tractor operation were so severe the top roller was worn out in three months' time. The Stoody Self-Hardening, however, kept the lower roller in operation for another three-months period, a life increase of 100%!

Cost of the Stoody Self-Hardening deposit can be ignored, considering benefits obtained and the time saved in eliminating an extra overhaul.

Hard-facing can be applied either of two ways: (1) A bead run around the outer edge and space between the bead and collar filled in with horizontal welds or (2) A bead around the outer edge to bring the roller back to diameter, and intervening area between outer edge and collar filled with a continuous spiral of hard metal. Either method is equally successful but the latter has the advantage of more easily maintaining roller concentricity.



Have you received your copy of Stoody Specification Sheets? They illustrate and describe dozens of equipment-saving applications thru the use of hard-facing—sent free on request.

*The preliminary high carbon build-up can be eliminated if Stoody Self-Hardening is applied before excessive wear has occurred on the roller.

STOODY COMPANY
1138 WEST SLAUSON, WHITTIER, CALIF.

STOODY HARD-FACING ALLOYS
Stop wear . . . Eliminate Repair

PIPE LINES

WEP Products Stream Nears End of 20-in.

The head of the stream of products pumped through the War Emergency Pipelines, Inc., 20-in. line was at a point 25 miles west of Station 24, near Marietta, Pa., within 160 miles of the Linden, N. J., terminus at 7 A. M. February 28. The process of filling the line will be completed March 1 or 2. Progress of the stream was delayed by difficulties in mountainous areas of Pennsylvania.

The WEP 24-in. crude-oil line has delivered an average of considerably more than 300,000 bbl. daily. Shipments most of the time have been in the 310,000 to 315,000 bbl. daily range.

Future of WEP Lines Is Discussed

T. E. Swigart, president, Shell Pipe Line Corp., commented at sessions of the annual meeting of American Institute of Mining and Metallurgical Engineers regarding the future competition of War Emergency Pipelines, Inc., lines with tankers for transportation of crude oil. Any advantage which the lines would have over tankers after the war, he said, would be too slight to justify purchase and operation by private companies. He predicted the possibility of a post-war use "of only one segment of one line when the war emergency ends."

Suggestions of Sidney A. Swensrud, vice president, The Standard Oil Co. (Ohio) presented to the institute regarding conversion of one or both of the WEP lines to natural-gas service were abstracted in The Oil and Gas Journal, February 24 issue, page 65.

Phillips Plans West Texas System

Laying of an 8-in. gathering system in West Texas to collect its own oil for delivery to purchaser or purchasers is planned by the Phillips Petroleum Co. for a system to be operated by its subsidiary, Standish Pipe Line Co. The Phillips company now owns or controls approximately 15,000 bbl. of daily production in the Permian Basin, and the gathering system is planned as the first leg of what eventually will be a pipe line from West Texas to the Phillips refinery at Borger in the Panhandle of Texas.

Application for the gathering system already is reported to have been filed with and approved by the District 3 committee, and now has been submitted to the Petroleum Administration for War.

Original plans called for 22 miles of 8-in. line to collect oil from the Embar pool in southern Andrews County, Texas, which produces from the Tubb and Ellenburger horizons, and to the Goldsmith, North Cowden, Foster and Harper pools in Ector County. However, it is understood that the District 3 committee removed the Harper and Foster pools from the application, with extension of the gathering system into these pools deferred to a later date.

As a result, the application before the PAW calls for the laying of an 8-in. gathering system in the Embar, Goldsmith and North Cowden pools. It was not announced by the Phillips company to what purchaser or purchasers the oil would be delivered after it has been gathered.

While present plans for the crude line call for only a gathering system, it is understood that Phillips eventually plans to extend the system on to Borger, Tex. As planned, a 6-in. line would be laid paralleling its present 8-in. natural-gasoline system, operated under the name of Mextex Pipe Line Co. The latter would be converted into the crude carrier and the 6-in. line would be used for moving the gasoline.

I.C.C. Orders Cut in Wyoming Oil Rates

The Interstate Commerce Commission has reached a decision to lower the rates for transportation of crude oil by pipe line from Rock River station, Wyo., and from the Lance Creek and Salt Creek, Wyoming, oil fields to Woods Cross, Utah, in a case brought 2 years ago by Minnelusa Oil Corp., a Rocky Mountain producer and marketer of crude, and by Wasatch Oil Refining Co., a refiner at Woods Cross. Defendants were Continental Pipe Line Co., Rocky Mountain Pipe Line Co., Stanolind Pipe Line Co., Utah Oil Refining Co., and Wasatch Oil Refining Co. Basic proper rates set are 37 cents from Rock River station; 55 and 68 cents, re-

spectively, from Lance Creek station and Salt Creek station. Reparation is awarded on shipment moved on and after February 17, 1942.

Magnolia Installs Unit At Sealy Station

Construction work on the installation of a new unit at the Magnolia Pipe Line Co. pumping station, about a mile south of Sealy, Tex., will be started shortly.

The new unit will be the seventh at this station and will have a pumping capacity of 12,000 bbl. a day. This unit will give the station a capacity of between 75,000 and 80,000 bbl. a day.

Seven More Compressors Planned for Hugoton Line

WASHINGTON, D. C. — Applications were filed here last week by Cities Service Gas Co., Bartlesville, Okla., and Cities Service Transportation and Chemical Co., Ponca City, Okla., for certificates for additional natural-gas facilities in Oklahoma. These are: (1) a joint application filed by the Cities Service Gas Co. and Cities Service Transportation and Chemical Co. for a certificate for seven additional 1,000-hp. gas-compressor units and related facilities to be installed by the Transportation and Chemical Co. in its Guymon, Okla., station at an estimated cost of $1,298,354 and, when completed, to be operated by the gas company under a proposed lease dated January 1, 1944, between the applicants; and (2) an application filed by the Cities Service Gas Co. for authorization for the construction and operation of a cooling tower to be at the Blackwell station, Kay County, Oklahoma, and 35 miles of 16-in. loop line from the Blackwell station to Osage County, Oklahoma, at a total estimated cost of $724,300.

Application Withdrawn on Two Wyoming Pipe Lines

Applications by the Superior Oil Co. and the Toronto Pipe Line Co. for permits to build pipe lines from the Pilot Butte field to Hudson and from the Steamboat Butte field to Arapaho, both in Fremont County, Wyoming, pending before the Wyoming Public Service Commission, have been cancelled at the request of the applicants. It is stated that this action does not mean abandonment of the projects, but that construction of a joint line will be held in abeyance until the requirements for the fields are more fully determined by development when the application will be removed.

West Texas Outlets Approach Completion

Magnolia Pipe Line Co. plans completion of the Midland-Corsicana, Tex., 12-in. crude-oil line March 1 and operation is to start March 10.

Stanolind Pipe Line Co.'s Slaughter, Tex.,-Drumright, Okla., 16-in. crude-oil line is scheduled for initial operation April 1.

M. & C. Opens Fort Worth Office

The M. & C. Construction Co., 513-14 Dan Waggoner Building, Fort Worth, Tex., has just been formed for the purpose of doing general pipeline contracting, with some special attention to reconditioning work.

L. H. (Spec) Morris is president of the new company. His experience in the pipe-line industry started in 1919. It will be recalled that Morris recruited and directed the personnel for the last six spreads of South American Gulf Oil Co.'s famous Barco line in Colombia in 1939. He accompanied these crews and directed operations along these six spreads.

B. V. Collins, vice president of the newly formed company, was formerly secretary-treasurer of the Aldous & Fesler firm of general contractors in Los Angeles, Calif.

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"Know-how"
Modern Equipment
Thoroughly Experienced
Personnel
COMPRESSORS
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An Outstanding Contribution to PIPELINE CONSTRUCTION
THE CLEVELAND TRENCHER COMPANY
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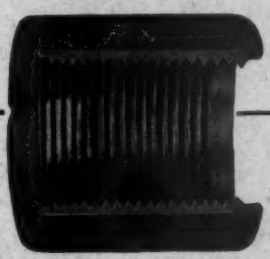
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COUPLINGS
Our special patented process of recessing "X-L" Couplings assures perfect alignment, tighter joints and protection of vanishing threads—giving longer life to the line. Made in strict accordance with A.P.I. standards in all sizes. Microscopically tested to insure maximum accuracy.
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Exploration and Drilling

Week's Highlights

CURRENT acceptance of pressure maintenance as a routine tool of production operations and the virtual assurance that it will become standard practice in most oil fields of the future has an important bearing on drilling and completion practices. Ability of operating departments to make early analysis of reservoir conditions will determine in many cases the success of mediocrity of pressure maintenance.

New tools and techniques in the drilling end of the business are contributing or are potentially valuable to early and accurate appraisal of sand conditions which in turn will permit engineers to select producing zones and injection levels in the reservoir with greater skill.

Reverse circulation for frequent recovery of cores possibly is the most significant development in drilling technique the past decade. Development of new pays in West Texas both above and below previously proven oil-bearing rocks is one of the tangible results from ability to take more frequent cores. Previously, the unreasonable cost of coring before the reverse-circulation technique was attempted and proven practical, caused certain pay zones to go unnoticed.

Another helpful development which may be delayed in its full range of applications until after the war is the use of plastics in shutting off water, gas or oil-bearing formations. Current development of plastics permits their use in oil wells under only limited conditions but the possibilities are extensive, according to production engineers who have studied the embryo technique and materials. If plastics can be developed to function as effective sealing agents under widely varied conditions they will permit a degree of selectivity in completion and production heretofore unknown. Thus, development and production engineers would be enabled to retain with almost calibrated exactness the sands or other types of pay strata most suitable for withdrawal of hydrocarbons and those that would serve most advantageously for return of gas to the reservoir.

The only deterrent remaining to universal adoption of pressure-maintenance technique concerns economics.

Solid line charts current weekly completions

COMPLETIONS IN ALL FIELDS . . .

(Week ended February 26, 1944)

	Oil	Gas	Dry	Total	Footage	Total Comp. to date 1944	1943
N. Y., Penna., W. Va.	42	20	5	67	132,827	481	455
Ohio	2	5	10	17	52,686	137	107
Indiana	1	0	3	4	8,822	44	43
Kentucky	2	5	4	11	28,416	90	35
Illinois	18	0	16	34	80,708	253	281
Michigan	6	0	5	11	35,750	84	60
Kansas	17	0	14	31	97,681	251	202
Nebraska	0	0	0	0	0	8	3
Missouri-Iowa	0	0	0	0	0	3	2
Oklahoma	11	2	12	25	90,864	219	170
Texas:							
North Central Texas	33	0	8	41	190,657	193	173
West Texas	30	0	3	33	160,958	220	137
Texas Panhandle	1	0	1	2	6,190	20	31
Eastern Texas	7	0	3	10	67,129	49	39
Texas Gulf Coast	6	0	0	6	35,207	74	60
Southwest Texas	12	4	10	26	143,225	153	130
Total Texas	89	4	25	118	603,366	709	570
Louisiana:							
North Louisiana	2	0	3	5	13,357	37	47
Louisiana Gulf Coast	4	0	5	9	88,443	57	52
Total Louisiana	6	0	8	14	101,800	94	99
Arkansas	5	0	2	7	32,747	33	31
Mississippi and Southeast	0	0	3	3	23,297	26	4
Montana	2	0	2	4	8,866	34	22
Wyoming	0	0	1	1	1,355	15	20
Colorado, Utah	0	0	0	0	0	4	1
New Mexico	4	0	7	11	29,502	58	29
California	35	2	4	41	151,623	275	152
Total United States	240	38	121	399	1,490,110	2,818	2,286
Total previous week	240	35	107	382			
Week ending Feb. 27, 1943	184	26	91	301			

Galveston Bay Discovery Is On Trend With Fields of Sizable Reserves

by E. H. Short, Jr.

HOUSTON, Tex.—The Standard Oil Co. of Texas has recently completed an important discovery well in the Galveston Bay area, Chambers County, Texas, as another contribution to the industry's determination to uncover a sufficient petroleum reserve to meet the 1944 war requirements.

The discovery, in Section 109, (Fig. 1) was started January 4, 1944 and was completed February 15, at total depth of 8,626 ft. The oil is from the upper portion of Frio formation, and the pay zone extends from 8,125 ft. to 8,146 ft. Production enters the 7-in. casing through perforations from 8,135 ft. to 8,146 ft.

An official gage of the well's production has not been made, but on preliminary test it flowed clean, 40.8-gravity oil at the rate of 324 bbl. per day through a 5/32-in. choke, with a gas-oil ratio of 600 cu. ft. per bbl. Under the allowables set up by the Railroad Commission to stimulate interest in exploration, the well will be allowed 180 bbl. per day as a new field discovery.

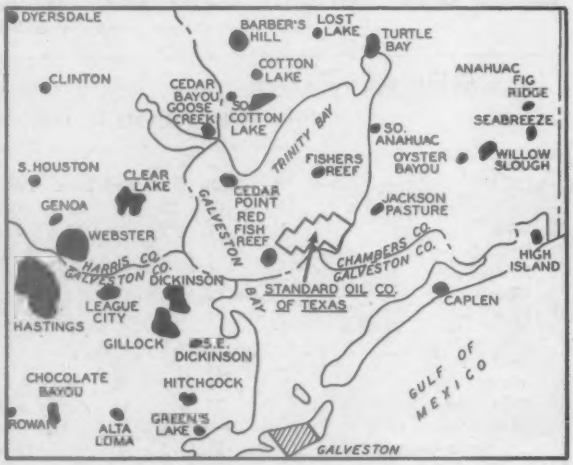
The area in which the well is located is complicated by the faulting which controls the accumulation of oil in this structural trend. Nevertheless, the significance of the new discovery as a discovery of potentially sizable new reserves is apparent when it is considered that it is located on the same major Gulf Coast structural trend as is Oyster Bayou, Willow Slough and Seabreeze fields. Also on the same trend is the Red Fish Reef field, 3½ miles southwest of the Standard of Texas discovery well, and the nearest land production is in the recently developed Jackson Pasture condensate-producing area approximately 7 miles to the northeast.

The discovery is structurally separated from the Red Fish reef field by a fault which has a thrust of approximately 600 ft. Therefore, the upper portion of the Frio formation, which is the principal producing sand in the Red Fish Reef area, occurs at a depth of around 8,700 ft. The oil from this zone has a gravity of 38. The possibilities for deeper producing sands in the discovery well appear favorable, since there are several productive sands in the Red Fish Reef area below the 8,700-ft. sand. Red Fish Reef also produces some condensate.

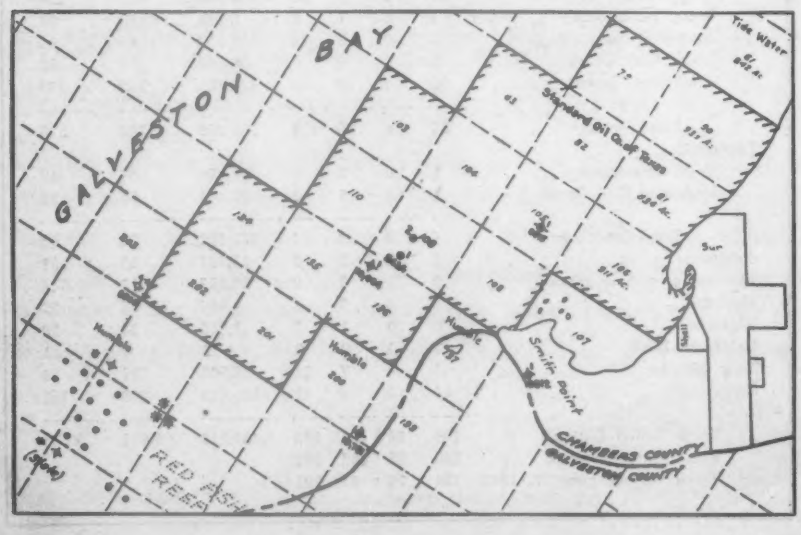
The Standard of Texas' well is on a block of state land consisting of 11,600 acres. The whole general area has been extensively shot, not only by this company, but also by several other major companies, and this fact explains the rather brisk bidding which took place when the acreage was offered. Confidence in the geological study and interpretation of geophysical data assembled during the preliminary investigation, is evidenced by the fact that the discovery well is the third test drilled on the block by Standard of Texas. The first two were dry. The first well, 2,000 ft. southwest of the discovery well was drilled to a total depth of 10,004 ft., and the second well, approximately 2 miles northeast, was dry at 8,875 ft.

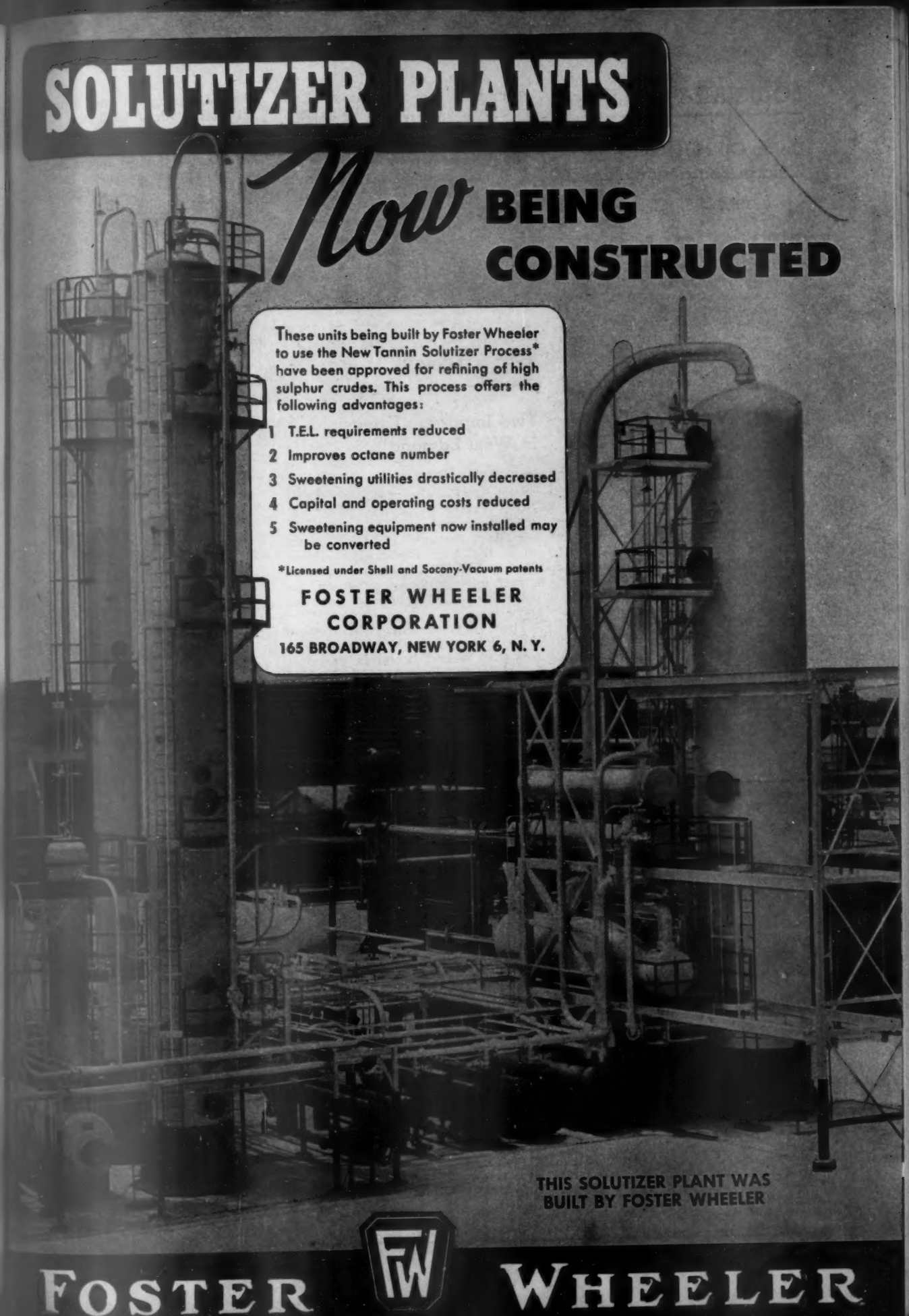
Upon this same structural trend several tests have been staked by other companies, and drilling will be commenced as soon as the weather permits. There is a tentative location on land, 5 miles northeast of the discovery well, and another land location was recently staked 7 miles northeast.

The Standard of Texas has staked the second location in the center of a 40-acre tract, 1,320 ft. northeast of the discovery well. Operators are now driving piling in the bay. Water in this vicinity is approximately 7½ ft. deep. The field will probably be developed on a 40-acre pattern.



Location of Standard Oil Co. of Texas' new Gulf Coast discovery in relation to other fields in Galveston, Harris and Chambers counties is shown at right. The discovery well and its north offsetting location are shown in the detailed map of Standard of Texas' block below

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These units being built by Foster Wheeler to use the New Tannin Solutizer Process* have been approved for refining of high sulphur crudes. This process offers the following advantages:
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LOUISIANA GULF

Union Oil May Open Field in Beauregard Parish

NEW ORLEANS, La.—Another field for the Louisiana Gulf Coast seems a possibility as Union Oil Co. of California prepares to run some tests in the 1 Edgewood L. & L. Co., wildcat in 25-6s-10w, Beauregard Parish, after setting 5½-in. casing. Total depth of the hole is 6,900 ft., but depths to be tested have not yet been revealed.

Gulf Refining Co. is preparing to test the 2 Schlicher-Thomas, 37-3s-1w, and if it produces it will open first Wilcox production on east flank of the Pine Prairie dome in Evangeline Parish. Total depth is 11,000 ft. and 5½-in. casing is set at 10,342 ft. Over on west side of the dome, Gulf is testing the 1-B Schlicher-Thomas, 35-3s-1w, total depth 10,555 ft., 5½-in. casing set at 10,553 ft.

Humble is preparing to start a new wildcat in the Labadieville area of Ascension Parish, in 100-14s-15e. It is the 1 Alfred G. Robichaux and is scheduled to go to 11,500 ft.

W. T. Burton reworked and recompleted the 10 Lutcher-Moore, in 13-9s-13w, flank discovery well at Starks dome in Calcasieu Parish. The well had originally been completed in January in perforations at 8,040-60 ft. for 113 bbl. a day on 3/32-in. choke, but it began showing sand and mud, so perforations were squeezed. Pipe was reperforated with 56 holes at 8,045-55 ft. for recompletion, 2-in. casing was set at 7,946 ft., and the well made a new potential of 145 bbl. pipe-line oil per day on ⅛-in. choke, tubing pressure 2,725 lb., gravity 46°. Gravity in the original perforations had been 39.1°.

LOUISIANA GULF COAST WILDCAT COMPLETIONS

Terrebonne Parish: Humble O. & R. Co. 1-C LaTerre Co., Inc., 81-18s-18e, in South Houma area, dry at 10,175 ft., sandy shale

Vermilion Parish: Phillips Petr. Co. and Tide Water 1 F. Z. Godchaux (Stowell) 88-14s-3e, Intra-Coastal City area, dry at 12,526 ft.

Tangipahoa Parish: Humble O. & R. Co. 1 Jos. Rathborne Ld. Co., 25-7s-7e, Ponchatoula area, dry at 9,314 ft.

OKLAHOMA

Two Important Extensions In West Edmond

THE West Edmond field was extended ¾ mile north by Fox & Fox 1 Peterson, NE SW 19-14n-4w, officially completed flowing 300 bbl. per day through 12/64-in. choke, while the same firm's No. 1 David Keefer, NW NW 4-13n-4w, indicated a half mile southeast extension, reported flowing 100 bbl. per hour for three hours.

These developments will confirm the opinion of those operators who feel that West Edmond is the most important Oklahoma prospect for 1944 development.

Garvin County.—Ramsey Petroleum No. 1 McDowell, NE SE 13-3n-1e, found production in Pennsylvanian sand at 2,960-84 ft. The well pumped 35 bbl. per day of 33.0-gravity oil, after being plugged back from original total depth of 3,170 ft.

Okfuskee County.—Northern Ordnance 1 Klahzuba, SW NW 7-13n-7e, made a good pumper in the Red Fork pay at 3,226-57 ft., after testing to 4,139 ft. and plugging back. Reported pumping 127 bbl. per day.

Osage County.—Oklahoma Power & Water Co. 2, NW NE SW 17-22n-8e, completed as 3,000,000 cu. ft. gas well, pay 2,300-30 ft. after testing to total depth 2,635 ft.

Washita County.—Gulf Oil Corp. 1 Dessie Hopkins, NE SE 8-8n-20w, which opened the West Sentinel field in 1943, was reported officially completed at 6,591 ft., after plugging back from 9,971 ft. Reported flowing 120 bbl. of 33.7-gravity oil per day.

OKLAHOMA WILDCAT COMPLETIONS

Atoka County: Stanolind-Amerada 1 N. V. Leonard, SE SW NE 25-3s-9e, dry, TD 2,345 ft., Wapanucka 1,960 ft.

Garvin County: Ramsey Pet. 1 E. E. McDowell, NE SE 13-3n-1e, pumped 35 bbl. 33-gravity oil, Pennsylvanian sand 2,960-84 ft., TD 3,250 ft., PB 3,170 ft.

Hughes County: Burke Gries Oil Corp. 1 Wilbanks, NW NE NW 2-5n-9e, dry, TD 4,631 ft., second Cromewll 4,595 ft.

Lincoln County: Northern Ordnance 1 Johnston, SW NW NW 6-14n-5e, dry, TD 4,370 ft., Layton 2,750 ft., Red Fork 4,023 ft.

Okfuskee County: Northern Ordnance 1 Klahzuba, SW NW 7-13n-7e, pumped 127 bbl., Red Fork 3,226-57 ft., TD 4,139 ft.

Oklahoma County, N extension to W Edmond: Fox & Fox 1 Peterson, NE SW 19-14n-4w, flowed 300 bbl., 12/64-in. choke, Hunton 6,894-6,940 ft.

Osage County: Champlin Ref. No. 1, SW SW NE 1-23n-3e, dry, TD 4,150 ft., Layton 2,880 ft.

Oklahoma Power & Water No. 2, NW NE SW 17-22n-8e, 3,000,000 cu. ft. gas, sand 2,300-30 ft., TD 2,635 ft.

Washita County: Gulf Oil Corp. 1 Dessie Hopkins, NW SE 8-8n-20w, flowed 120 bbl., 33.7-gravity, granite wash 5,940-5,620 ft., 6,425-6,591 ft., TD 9,971 ft. in Arbuckle, PB 6,591 ft., discovery of W Sentinel (1943).

DAILY AVERAGE PRODUCTION FOR WEEK

	Feb. 26 crude oil	Distillate, allied products	Feb. PAW quota all oils	Feb. 19 crude oil
Arkansas	78,800	5,100	81,780	78,710
California	820,250	46,700	883,200	*806,500
Colorado	8,670	.....	7,000	8,390
Eastern fields	68,720	10,000	82,200	69,450
Illinois	211,140	12,600	227,600	203,825
Indiana	12,450	.....	14,000	14,320
Kansas	279,700	6,100	291,100	268,050
Kentucky	20,110	2,900	28,100	22,920
Louisiana	359,200	27,000	375,700	360,620
North Louisiana	76,100	.....	.....	77,420
Louisiana Gulf	283,100	.....	.....	283,200
Michigan	52,100	200	50,200	53,500
Mississippi	43,300	.....	46,000	42,600
Montana	24,970	300	24,000	22,500
Nebraska	1,100	.....	1,200	1,150
New Mexico	112,525	5,900	116,600	113,100
Oklahoma	324,500	28,000	356,000	325,400
Texas	1,916,250	132,000	2,018,000	1,909,250
East Texas	390,600	.....	.....	390,600
West Texas	362,000	.....	.....	362,000
North Central Texas	139,950	.....	.....	139,900
East Central Texas	116,850	.....	.....	110,250
Texas Panhandle	102,000	.....	.....	102,150
Texas Gulf Coast	709,750	.....	.....	705,500
Southwest Texas	95,100	.....	.....	98,850
Wyoming	95,430	5,800	98,800	97,150
Total United States	4,429,215	282,600	4,701,480	*4,397,435

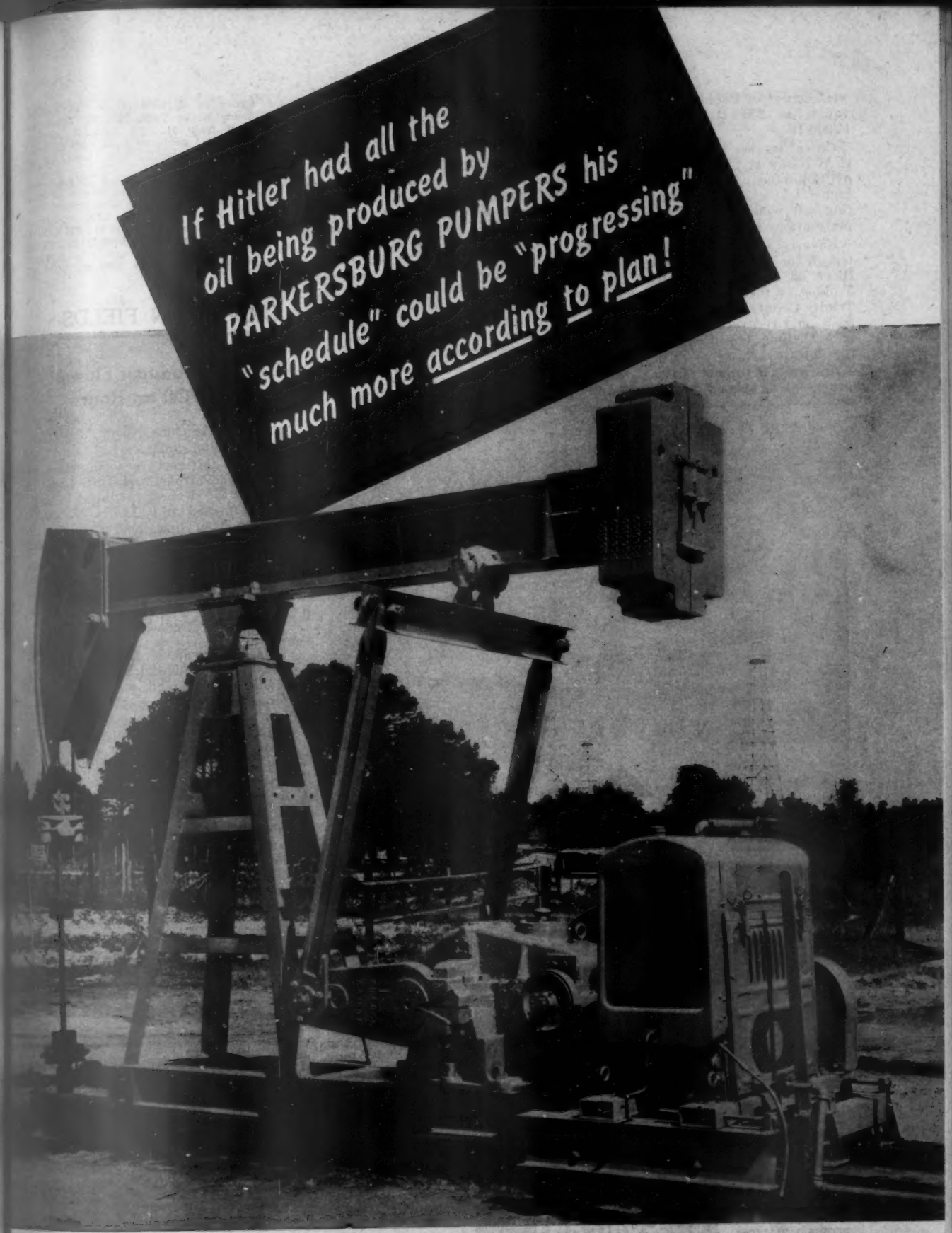
Total production, January 1-February 26, 1944 ..... *250,556,225 bbl.
Same period last year ..... 219,972,890 bbl.
*Revised.

TEXAS GULF COAST

New Wildcat Announced In Colorado County

HOUSTON, Tex.—Sinclair Prairie Oil Co. 1 A. J. Thompson, new discovery well in the New Ulum area of Colorado County, Charles Fridshe Survey, was preparing to test through separators from perforations at 8,177-82 ft. It had flowed 4 to 5 bbl. condensate per hour on preliminary tests with considerable gas, no water, working pressure 2,400 lb., gravity around 50°. Total depth 8,735 ft., 7-in. casing set at 8,728 ft. This is a Wilcox production.

A new wildcat for Colorado County was announced by Shell Oil Co., Inc., the 1 Hill State Bank & Trust Co., on 745.9-acre lease lying in W. K. Paulding Survey A-461, about 3½ miles southwest of Rock Island. It is 850 ft. north and 750 ft. east of south-


If Hitler had all the
oil being produced by
PARKERSBURG PUMPERS his
"schedule" could be "progressing"
much more according to plan!

PARKERSBURG

west corner of Paulding Survey. Elevation is 250 ft., contract depth 11,200 ft.

Cities Service and Jack Frazier 1 C. K. Gray et al, 3 miles northwest of Columbus, is preparing to test higher in the 7,300-ft. sand after getting salt water on drill-stem test in perforations at 7,320-24 ft.

Navarro Oil Co. ran a drill-stem test in the 1 Edward R. Bolton et al, Block 88, Henry Bond Survey A-75, 3 miles southeast of Saron townsite, Trinity County. The test was at 5,426-36 ft. and recovered only salt water. It is drilling ahead near the 6,000-ft. contract.

Amerada Petroleum Corp. 2 J. A. Graves et al opened a new oil sand in the Frio zone at North LaWard field, Jackson County, flowed potential of 56 bbl. a day on 5/64-in. choke, gas-oil ratio 446-1, tubing pressure 820 lb., casing sealed, 32-gravity oil, no water from perforations at 5,818-23 ft. Total depth 8,010 ft., 5½-in. casing set at 6,157 ft. Another new sand in Jackson County was opened by J. A. Gray's 1 W. W. McCrory et al, flowing potential of 96 bbl. per day on 7/16-in. choke, tubing pressure 425 lb., casing pressure 1,600 lb., gravity 28.4°, no water, gas-oil ratio 460-1, from perforations at 5,398-5,402 ft., top sand 5,398 ft., total depth 5,623 ft., 5½-in. casing set at 5,483 ft.

TEXAS UPPER GULF COAST WILDCAT COMPLETIONS

Jackson County: J. A. Gray 1 W. W. McCrory et al, new oil pay at Harman field, M. L. York Sur. 22, A-312, top sand 5,398 ft., TD 5,623 ft., 5-½-in. 5,483 ft., perforated 12/5,398-5,402 ft., PT 96 bbl. day 7/64-in. choke, TP 425 lb., CP 1,600 lb.

Amerada Petr. Corp. 2 J. A. Graves et al, new pay discovery at North LaWard in Blk. 11, Pickering Rch. subdn., Patrick Scott Sur., A-69, 1,325 ft. NW of 1 Graves, top sand 5,818 ft., TD 8,010 ft. PB 5,830 ft., perf. 5,818-23 ft., PT 96 bbl. day 5/64-in. choke, 7-in. 5,233 ft. 5½-in. 6,157 ft., 2-in. 5,827 ft.

CANADIAN FIELDS

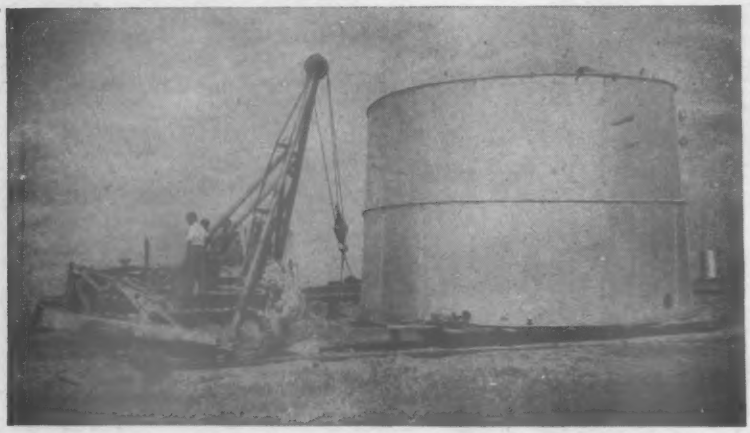
Deepest Producer Flows 20 Bbl. of Oil an Hour

CHATHAM, Ont.—North Turner Valley extension area has been widened to the east by completion of Northend Petrbleums 1, LSD 12, 9-21-3w5, as the deepest produced in Canada. Finished at 9,612 ft., 683 ft. in the Madison limestone after partial acidizing, with the upper zone partly mudded off, it started at 32 bbl. an hour, settling to 20 bbl. The well stood unfinished for months, operators believing it was outside the producing area, till Imperial Oil assisted in the completion.

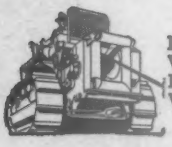
Saskatchewan. — After exhaustive tests of all potential horizons in the Madison, Devonian and Ordovician limestones, two deep tests in southern Saskatchewan, Norcanols-Ogema 1, LSD 4, 24-7-23w2, drilled to around 9,234 ft., and Norcanols-Parry 1, LSD 16, 8-9-21w2, drilled to 9,042 ft., are preparing to abandon. Both are believed to be flank wells on the edges of an extensive structure. Norcanols-Corinne 1, LSD 15-16, 32-13-20w2, is being started on a location more favorable structurally.

Tar sands.—Hon. N. E. Tanner, minister of lands and mines for Alberta, has announced that more research work is being planned in connection with the utilization of the bituminous sands of northern Alberta. The work will be under direction of Dr. K. A. Clark of University of Alberta, who has specialized in the testing and separation of tar sands. Information obtained by such research will be made available to private companies. The Alberta government has asked the Dominion government to release the province from an agreement made some years ago, which provided for reservation of tar-sand areas and has prevented the filling of claims. It is understood private interests are prepared to undertake extensive development.

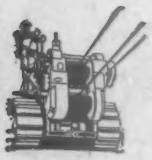
Vermilion.—In the Vermilion field, eastern Alberta, Sweetgrass Oils, Ltd., has signed a contract for the drilling of 15 wells on acreage close to the holdings of Cannar Oils. Sweetgrass 1 will be drilled in NW 29-50-5w4, offsetting the Cannar producers to the



HYSTER TOWING WINCHES



HYSTER WORM DRIVE WINCHES



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HYSTER Tractor Drums

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east, and close to the Vermilion Consolidated conditioning plant at Borrodaile.

PERMIAN BASIN

Sand Hills Well Flows 11,741 Bbl. From New Pay

MIDLAND, Tex.—A gusher for the Sand Hills pool of Crane County from a shallower pay was completed at Gulf Oil Corp. 45 W. N. Waddell, northeast side of the field, in southwest corner Section 27, Block B-26, Public School Land, which made an initial potential gage of 11,470 bbl. per day from total depth of 3,230 ft. A few weeks ago this well surprised everyone when it showed as a producer from this horizon, which usually shows gas. On preliminary tests it flowed 308 bbl. the first hour, 384 bbl. the second hour, with about 8,000,000 cu. ft. gas, and it was reported that the flow lines would not handle the oil.

Crockett County.—A new field was assured at Sohio Production Co. 1 Shannon, SW SE Section 24, Block 1, GC&SF Ry. Survey, 3½ miles north of Live Oak field, which made a good flow, gage not available, after acid treatment at total depth 2,185 ft. The test has been showing oil from 2,015 ft. to total depth, and previous to acid treatment had swabbed 35 bbl. per day. South offset has been staked by Sun Oil Co., and John I. Moore has staked a west offset.

Howard County.—Another possible pay zone has been discovered in the Vincent pool. W. S. Guthrie 1 Roy Guffey, east offset to the discovery well, missed the pay and drilled deeper to 4,316 ft., where the hole filled 1,000 ft. with oil. The well started showing oil at 4,284-94 ft., and 4,314-16 ft. Storage is being erected at the site for a production test.

Winkler County.—North offset to the Keystone-Ellenburger discovery, Amon G. Carter C-3 Walton topped Ellenburger at 9,314 ft., 85 ft. lower than the discovery well. Disappointment in the Clear Fork was seen at Sun Oil 3 Walton, which perforated and treated with acid at 4,999-5,009 ft., and filled with sulfur water. In the Wheeler pool, Mid-Continent Petroleum 1 Wheeler, ½ mile northeast of the discovery, topped the Ellenburger at 10,570 ft., 48 ft. lower than the discovery, and was showing both oil and gas. Stanolind-Shell 1-A Wheeler, ½ mile west of the discovery, was below the depth at which production was obtained in the discovery, and has not yet topped the Ellenburger.

WEST TEXAS WILDCAT COMPLETIONS

Andrews County: DeKalb Agricultural Association 2-E University, NE SW Sec. 5, Blk. 6, University, elev. 3,099 ft., anhydrite 2,180 ft., Yates 3,320 ft., brown lime 4,560 ft., San Andres lime 4,880 ft., dry at TD 5,510 ft.

Mitchell County: W. S. Guthrie 1 R. L. Solomon, 660 ft. from S and W, E½ Sec. 71, Blk. 97, H&TC Ry. Sur., elev. 2,264 ft., broken shows of oil 2,710-2,844 ft., dry at TD 4,025 ft.

Pecos County: Phillips Petroleum 1 Pascoe, SE NW Sec. 114, Blk. 11, H&GN Ry. Sur., 2½ mi. W of Oswego discovery, dry at TD 4,635 ft. in granite.

(Week ended February 19)

Irion County: Humble Oil & Ref. 2-B Sawyer Land & Cattle Co., 1,980 ft. from N, 1,320 ft. from E, Sec. 3, O. G. Coulson Sur., elev. 2,390 ft., Yates 900 ft., Ellenburger 8,960 ft., dry at TD 9,501 ft.

Pecos County: Standard Oil Co. of Texas 1 Edith Trees et al, NE NW Sec. 27, Blk. 8, H&GN Ry. Sur., lost hole at 3,356 ft.

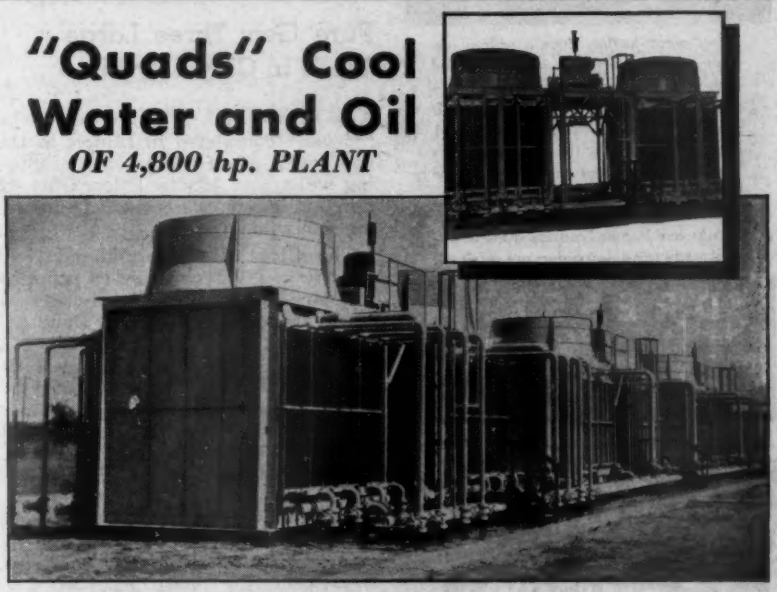
SOUTHEAST NEW MEXICO

HOBBS, N. M.—A new wildcat for Lea County was staked at Magnolia Petroleum 1-U State, SW SW 10-11s-35e, 9 miles northwest of Tatum. It is slated to go 5,500 ft. The southeast side of Maljamar field was defined at Lion Oil Refining Co. 1 Wyatt, NE NW 31-17s-33e, which was abandoned at 4,413 ft. after having a show of oil in the Maljamar pays. Humble Oil & Refining 1 Federal-Leonard, southeastern Lea County, was shut down for repairs at a total depth of 9,319 ft., but has continued drilling.

SOUTHEAST NEW MEXICO WILDCAT COMPLETIONS

Eddy County: Neil H. Wills 2 Zorichek, SE

"Quads" Cool Water and Oil
OF 4,800 hp. PLANT



★ The above battery of Young-Happy "Quad" Coolers maintains the jacket water and lubricating oil of eight 600 hp. v-angle compressors and driving engines at suitable operating temperatures. This installation at a Southern Illinois refinery* for the production of Iso-Butane and Butane has been in successful operation for more than a year. Four of the six units have oil cooling sections mounted in front of the jacket water cooling cores. Auxiliary engines (each serving two units) rotate 10 ft., especially designed, induced draft fans through right angle speed reducers. At present, cores are installed in only two sides of each "Quad", leaving room for increased cooling capacity to take care of future plant expansion. Write for complete engineering data.

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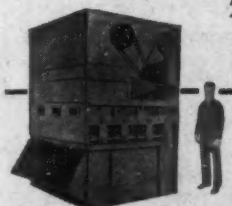

*Three "Quad" Condensers are used to condense 40,000 lbs. of steam per hour at 10 lb. gauge pressure.

Young "Quad" Coolers and Condensers function on the same principle as automotive radiators—there are no water losses or external pumping heads. Where temperatures below the ambient dry bulb are required Young evaporative type units (left) may be used independently or supplementary to "Quads". Minimum operating costs and water make-up requirements are assured with these efficient evaporative coolers and condensers.

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"They were having trouble with quicksand so they drove pipe with perforated ends into the sand and extracted the water in vacuum. The header is 6"ID steel pipe, approx. 200' long. The 51 intake lines are 1½"ID, 4' apart."
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RESULT OF 40 YEARS' LUBRICATOR BUILDING EXPERIENCE

McCORD RADIATOR & MFG. CO. DETROIT, MICHIGAN LUBRICATOR DIVISION

NW 5-20s-31e, elev. 3,455 ft., dry at TD 2,470 ft.

Lea County: Gordon M. Cone 1-A State-Berry, 1,980 ft. from S, 2,080 ft. from W, 30-18s-37e, elev. 3,735 ft., white lime 3,910 ft., brown lime 2,673 ft., SO 3,350-4,575 ft., dry at TD 4,609 ft.

(Week ended February 19)

Lea County: Skelly Oil 1-V State, NE NE Sec. 7-22s-35e, 1½ mi. SW San Simon discovery, dry at TD 4,460 ft.

PANHANDLE WILDCAT COMPLETIONS

Oldham County: Stanolind Oil & Gas 1 Green, granite 6,080 ft., dry at TD 6,114 ft.

ILLINOIS

Pure Gets Three Large Wells in Clay City Field

MATTOON, Ill. — Thirty-four wells were completed in Illinois in the past week, 18 of these being producing wells, and 16 dry holes. Only 22 new operations were started, including no wildcats

The Clay City Consolidated field in Clay and Wayne counties supplied the largest initial producers of the week on leases owned by Pure Oil Co. Pure 2 L. A. Frazier, C SW NE 15-1n-8e, flowed and pumped 1,021 bbl. in 24 hours following a 5,000-gal. acid treatment of McClosky lime, 3,084-3,133 ft. The well pumped 571 bbl. a day before the acid treatment. Pure 1 M. Rogers, E½ NW NW 23-1n-8e, started at 455 bbl. from McClosky lime, 3,051-3,113 ft., and Pure 2 E. Flexter, NW SW SE 34-2n-7e, and 1 Pipher, C SE NW 25-3n-8e, were good for more than 300 bbl. each from the McClosky formation.

None of the wildcat completions was productive.

Sinclair Wyoming Oil Co. 1 B. W. Hess, C NW SW 10-4n-6w, Marine pool, Madison County, which had swabbed 878 bbl. of oil in 16 hours from Devonian lime at 1,718-68 ft., later flowed naturally, producing 373 bbl. of oil and 17 bbl. of salt water in 24 hours.

ILLINOIS WILDCAT COMPLETIONS

Clinton County: J. L. May 1 Gross, NE SE NE 31-2n-2w, dry at 1,300 ft., base of Pennsylvanian 868 ft., Tar Springs 868 ft., Cypress 1,138 ft., Weiler 1,156 ft., Benoist 1,268 ft.

Douglas County: Sam Burkett 1 Van Aukin, NE SW SW 20-15n-10e, dry at 834 ft., Osage lime top 827 ft.

Jefferson County: Texas 1 N. Cowger, NW NW NW 11-3s-3e, dry at 3,085 ft., Glen Dean 2,347 ft., Cypress 2,583 ft., Benoist 2,756 ft., Aux Vases 2,832 ft., McClosky 2,937-45 ft.

Kendall County: Herndon 1 R. Proctor, NE NE SE 36-36n-8e, dry at 2,328 ft.

Montgomery County: R. E. Schneider 1 Taylor-Walcher, SW SW SE 16-9n-3w, dry at 956 ft., Benoist sand top 921 ft.

Saline County: Jarvis & Marcell 1 Sisk A, NW NW SE 15-10s-6e, dry at 2,021 ft., Menard 1,365 ft., Cypress 1,929 ft.

Washington County: Magnolia 1 R. R. Torrens, NW NE NW 30-3s3w, dry at 1,638 ft., upper Glen Dean 938 ft., Cypress 1,179 ft., Weiler 1,198 ft., Benoist 1,307 ft., Aux Vases 1,408 ft., McClosky 1,500 ft.

Wayne County: Smith & Miller 1 Maxie-Brown, SW NW SW 7-2s-5e, dry at 3,104 ft., upper Kinkaid 1,882 ft., Cypress 2,661 ft., Weiler 2,728 ft., Aux Vases 2,926 ft., McClosky 3,040-46 ft.

ROCKY MOUNTAIN

Little Buffalo Basin West Dome Dry in Madison

DENVER, Colo.—The west dome of Little Buffalo Basin field in Park County, Wyoming, which is being tested by Stanolind Oil & Gas Co. below the Frontier gas sands at 1 Unit, SW SW NE 34-38n-100w, failed to find oil in the Madison lime and is drilling ahead to test all possible formations. It is near the top of the structure as mapped by the U. S. Geological Survey on the Frontier and 3½ miles northwest of the Goodstein discovery well in the Tensleep on the east dome. At 5,776 ft. it was in sand, 200 ft. below the top of the Madison and showing water but no oil. It previously had shown water in the Tensleep at 5,042 to 5,326 ft. Stanolind has made a location for a second well in the NE NE NW 12-47n-100w, a mile north of the Goodstein well.

Garland wells still waiting. — Two wells drilled by the Ohio Oil Co. and the General Petroleum Corp. 4 miles apart on the flanks of the Garland dome which showed oil in the Tensleep below the gas cap in that horizon with no signs of water in the pay, are still waiting for pumping tests. In the meantime locations for three more wells indicate that the operators are convinced the water line extends considerably farther out on the flanks and will proceed at once to determine the area of the discoveries.

Second Ingomar well making gas.— Last November Northern Ordnance, Inc., made a gas discovery in the Amsden sand at 3,910 to 4,030 on the Ingomar dome, Rosebud County, Montana, on a farmout from Carter Oil Co., which gaged 8,200,000 cu. ft. with 1,000 lb. pressure. Northern Ordnance them moved a mile to the south and drilled its second well and at 3,940 ft. the rig caught fire and burned down. It had a flow of gas at 3,920-25 ft. and upon resuming operations encountered a second flow at 3,941-55 ft.

Development in Rangely deep pay. The California Co. has made a location for its 1 Emerald, C NE SW 30-2n-102w, Rangely field, Rio Blanco County, Colorado, a west offset to its 1 Raven, which was completed in 1933 in the Weber sand of Pennsylvanian age at 6,335 ft., total depth. The discovery was shut in until last September when it was put on production and made 227 bbl. of 34.9-gravity oil

per day through a 34/64-in. choke on the tubing.

WYOMING WILDCAT COMPLETIONS

Dallas, Fremont County: W. H. Barber 1 Redbreast, CWL NE SE 11-32n-99w, TD 1,355 ft., tested Tensleep, plugged and abandoned.

NORTHWEST NEW MEXICO WILDCAT COMPLETIONS

Fulcher Basin, San Juan County: West & Steele 1 Brimhall, CSL SW SE 3-29n-15w, dry and abandoned at 1,106 ft.

MICHIGAN

Six Producers and Five Dry Holes Completed

SAGINAW, Mich.—All five dry holes completed last week in Michigan were wildcat ventures, including two deep tests, one to 4,050 ft. in Wayne County, another to 4,270 ft. in Missaukee County. Of the six producers on the completions report, the best well was that of Freeman Oil Co. in Section 31 of Hatton Township, Clare County. After acid treatment, the well, in an area marked generally by heavy production or nothing at all, flowed 180 bbl. in 4 hours. Ohio Oil Co. completed a 600-bbl. well in Rose Lake Township, Missaukee County, and small wells were brought in in Van Buren, Newago, Bay and Allegan counties.

MICHIGAN WILDCAT COMPLETIONS

Gratiot County, Arcada Township: C. E. Weller-T. F. Caldwell, Inc., 2 James Davidson, NE NW SW 36-11n-3w, dry in Dundee, TD 3,235 ft.

Kent County, Plainfield Township: S. L. McCall 1 Clifford Alles, SW NW SW 12-8n-11w, dry in Traverse limestone, TD 2,345 ft.

Missaukee County, Reeder Township: Eugene Hilliard 1 George W. Woods estate, SW SW SW 14-22n-7w, dry in Detroit River formation, TD 4,270 ft.

Newaygo County, Lincoln Township: Sun Oil Co. 1 Marjorie H. Schmidt, C S½ SE SE 1-14n-13w, dry, TD 3,166 ft.

Wayne County, Huron Township: Voorhees Drilling Co. 1 B. Theison estate, NE SE SE 16-4s-9e, dry, TD 4,050 ft.

APPALACHIAN FIELDS

Good Gas Well Reported In Wood County

PITTSBURGH, Pa.—In Harris district, Wood County, West Virginia, West Virginia Gas Corp. failed of production in the wildcat on the Peter Seebaugh farm, after drilling through the Oriskany sand. Starting at an elevation of 846 ft., Corniferous lime was topped at 4,297 ft., Oriskany at 4,407-37 ft., show gas (29,000,000 cu. ft.) at 4,409 ft., TD 4,507 ft.

In Union district, Wood County, Waverly Oil & Gas Co. (A. M. Cooper) brought in a good gas well in a test on the Catherine Cass farm gaging

Design and Material *Adapt Amsco-Nagle Pumps* to the Handling of Coke Breeze...

The water ends of Amsco-Nagle centrifugal pumps are always made of metals best adapted to withstand the corrosive or abrasive conditions under which each pump must operate. When three Amsco-Nagle 3" type "SW" units with 14" impellers were made for a petroleum refinery, this matter was given the usual consideration.

In a coking unit quenching system these pumps handle water containing petroleum coke breeze which, being severely abrasive, has a severe scouring action. The pumps were fitted with water end parts of austenitic manganese steel, in this particular case, which ranks high in its resistance to this action.

The design also plays a part in the successful operation of these pumps, which have been on the job for about three years. Notably, the water end inlet is inverted. That is, instead of a bottom inlet, the liquid enters from the top of the casing. This eliminates air or gas binding and causes hydraulic thrust to counterbalance the weight of the revolving parts. Simple, liberal slippage seal adjustment is provided. The tubular structural members serve a dual purpose; one as an outlet pipe and the other as a duct for lubricant to the submerged bearings.

One of these pumps is shown, before and after installation, in pictures R-532 and P-59-N. Another, shown in picture P-62-N, is a 2" turbine-driven pump built to handle residue from a coke by-products still in a Midwestern refinery.

Amsco-Nagle pumps are available in two horizontal and three vertical types and in sizes from ¾" to 16", with impellers as large as 48" in diameter, for capacities up to 10,000 gallons per minute and for heads as high as 200 feet. Ask for Bulletin No. 940.

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NON-SPARKING SAFETY TOOLS

1,565,000 cu. ft. from the Berea, TD 2,136 ft.

In Tucker County on the Blackwater anticline in Dry Fork district, Ohio Oil Co. abandoned the fishing job for two lost strings of tools in the deep wildcat on the Kaemmerling tract and set a whipstock at 7,500 ft. using a directional-survey company in the work. The window in the casing has now been milled out and the hole sidetracked from this point. About 500 ft. of new drilling will be required to reach the old hole's depth from which there is a sustained volume of about 125,000 cu. ft. of gas and from what is believed to be the Oriskany caprock.

N. CENTRAL TEXAS

Probable New Field Opened In Wichita County

WICHITA FALLS, Tex. — A new field from Ellenburger lime seems to have been opened in southern Wichita County at W. H. Rogers, Jr., 1 T. O. Shappell, Block 16, Cowherd subdivision, 2 miles south of Iowa Park. The test swabbed 2½ bbl. oil per hour, with 2½ bbl. water, after the Ellenburger section from 5,087-5,110 ft. had been treated with 1,000 gal. of acid. This well had several shows of oil in Strawn and Caddo formations.

Grayson County. — Interest was drawn to Sinclair Prairie Oil Co. 1 Fisher, J. Shelton Survey, 3 miles south of Whitesboro, which had shows of oil in Strawn sand from 3,482-88 ft. and 3,612-26 ft., and more shows from 3,711-42 ft. and 3,791-3,805 ft. The test is being drilled ahead to the Ellenburger, but the favorable showing has created a lease and royalty play throughout the west side of the county.

Cooke County.—Official completion gage on Northern Ordnance, Inc., 1 Foy Davis, discovery 1 mile east of Woodbine, showed it capable of making 110 bbl. of 28° gravity oil per day, 1.6 per cent water, from Strawn sand pay. Total depth is 4,357 ft.

Archer County.—Bridwell Oil Co. 1 J. S. Bridwell River Ranch, Block 3, Word & Houssel subdivision, cored hard sand showing oil from 5,106-16 ft., and was drilling ahead. This wildcat, located 3 miles northeast of Scotland, is scheduled to go 6,000 ft.

Clay County. — The Ross pool was extended a short distance east at Continental Oil 1-A W. E. Williams, William Walker Survey, which was completed pumping 116.58 bbl. oil and 6.89 bbl. water per day, total depth 4,064 ft.

Montague County.—C. H. Murdick 1 Walthall, extending the Hildreth pool westward, was gaged at 122.82 bbl. in 4 hours through ½-in. choke, total depth 6,275 ft. In the eastern part of the pool, Sinclair Prairie Oil Co. 3 W. F. Middleton, Section 56, ET Ry. Survey, flowed 302.64 bbl. in 3 hours, and Continental Oil 1-A Middleton, Section 53, flowed 394 bbl. in 6 hours through ½-in. choke.

Two new important wildcat tests were announced for the district. In Denton County, Hassie Hunt will drill his 1 Aisley Martin 660 ft. south and east of southerly northwest corner of east 432-acre tract in J. Parks Survey, between two dry holes previously drilled by Hunt. In Young County, Kerlyn Oil Co. has staked 1 W. W. Cope, 330 ft. from south and west lines Section 1475, TE&L Survey, 3 miles northwest of Jean.

NORTH TEXAS WILDCAT COMPLETIONS

Young County: Auto-Ordnance 1 S. Dozier, 2,150 ft. from NE, 467 ft. from NW, C. P. Heartt Sur., 7 mi. W Graham, dry at TD 4,914 ft.

(Week ended February 19)

Archer County: W. W. Harvey et al T. B. Wilson, 1,680 ft. from E, 1,740 ft. from S, Blk. 151, Harris subd., dry, TD 1,401 ft.

M. W. Blair Oil Co. 1 Henry Conrady, Sec. 22, Clark & Plumb subd., Blk. 4, dry at TD 1,161 ft.

Clay County: Premier Oil Ref. and Joe Humphrey 1 Fred Wines, 467 ft. from N and W, Blk. 5, J. J. Hand Sur., 2 mi. E of Joy, Caddo 5,710 ft., Barnett 6,135 ft., dry at TD 6,329 ft.

Cooke County: R. W. Fair 1 John Streng, 330 ft. from NE, 330 ft. from SE, Sec. 975, SPRR Sur., dry at TD 1,970 ft.

WEST CENTRAL TEXAS

ABILENE, Tex.—Pumping potential of 10 bbl. per day with 50 bbl. of water has been taken on Merry Brothers & Perini, Alder Oil et al 1 W. D. Hawthorne, wildcat in J. W. McKissick Survey, 4 miles southwest of Anson, Jones County. This new field discovery had its pay from 2,533-40 ft., plugged back from total depth of 2,722 ft. Elevation is 1,717 ft. Another discovery for Jones County is Jones & Stasney and Eason Oil 1 J. D. Freeman, in H. Virm Survey, 2 miles west of Truby, but official potential has not been taken. It is producing from Gunsight lime at 2,793-2,815 ft., plugged back depth from 2,820 ft. One location southwest of this well the same operators have made location for 2 Freeman. C. H. Brodie, trustee, 1 C. T. Derrick is new wildcat location 1,361 ft. from north, 330 ft. from west line, Section 58, Block 18, T&P Ry. Survey, 3 miles northwest of Noodle. Another new wildcat is V. E. Autry 1 Fred Baker, 330 ft. from south and west lines of Block 6, De Witt County School Land, League 125, on the Jones-Taylor County line.

WEST CENTRAL TEXAS WILDCAT COMPLETIONS

(Week ended February 19)

Coleman County: Central Texas Gas 1 Henry T. Horne, 660 ft. from N and E, Sec. 154, A. S. Robinson Sur., dry at TD 1,140 ft.

Shackelford County: C. A. Montgomery & Norton Properties, 1,140 ft. from SW,

1,000 ft. from NW, Sec. 567, TE&L Sur., dry at TD 542 ft.

W. K. Wood 1 Ethel Thompson Simpson, 330 ft. from N and E, 80-ac. lease, Sec. 12, Blind Asylum land, dry at TD 530 ft.

SOUTHWEST TEXAS

Extension Well Finds New Pay Sand at Longhorn

CORPUS CHRISTI, Tex.—Hiawatha Oil & Gas Co. is completing the 15 Miller, northwest outpost, to open a new pay sand at the Longhorn field in Duval County, northeast corner Section 22, Ball Ranch subdivision, Agua Poquita grant. This new pay was logged at 4,495-4,535 ft. and drill-stem test showed 75 lb. working pressure, using ¼-in. chokes top and bottom, recovered 270 ft. oil-cut mud and 840 ft. pipe-line oil in 15 minutes. Casing was set and tanks constructed for the completion attempt now being made. The regular Longhorn field pays are at the 4,000-4,100-ft. and 4,900-ft. levels.

E. M. Jones 104 Ezzell, at southwest end of the Ezzell field in eastern McMullen County, Section 38, Ezzell Ranch subdivision, has proved a new sand for the field, in the Hockley zone. It failed in the regular pay sand when it showed salt water in this zone at 1,535-43 ft., but oil shows were found at the 1,200-ft. level in the Hockleyensis horizon. Casing was set to 1,270 ft., perforated 1,200-06 ft. It was swabbed dry, then filled 500 ft. with pipe-line oil in 12 hours and is estimated good for 20 to 25 bbl. per day on pump.

A new deeper pay was opened at the Odem field, San Patricio County, by Seaboard Oil Co. 1 Bomer, in highest part of the field, where all regular pay sands produce gas. The new deep sand, however, produces oil and is deeper than any previous oil pay. Potential showed a flow of 102 bbl. per day on ⅛-in. choke, tubing pressure 125 lb., casing pressure 1,025 lb., gas-oil ratio 702-1, 38.4-gravity oil, no water, from perforations at 6,781-83½ ft., top sand 6,775 ft., total depth 6,783½ ft. Actually only bottom 1 ft. of casing was perforated since the hole was deepened from 6,782 ft. to new depth of 6,783½ ft.

A new gas field is opened by Sun Oil Co. at 1 Z. Solis et al in NE corner Share 2-A, P. Longoria Porcion 94, 2 miles southwest of Frost field, 1½ miles east of Boyle field, in Starr County. It flowed estimated 8,500,000 cu. ft. of dry gas per day on open flow from perforations at 4,072-80 ft., total depth 5,515 ft., 5½-in. casing set at 4,120 ft.

SOUTH TEXAS WILDCAT COMPLETIONS

Brooks County: Humble Oil & Refining Co. 1 Scott & Hopper, in ACH&B Sur. 107, discovery well of Scott & Hopper field, 4 mi. N NE of Alta Mesa field, TD 6,912 ft., 5½-in. set at 6,912 ft., 2-in. tbg. 6,605 ft. Dual completed 12-20-43. Upper sand 6,584-6,605 ft., perforated 30/6,584-92 ft., flowed gas condensate through casing, est. 6,000,000 cu. ft. day, SIP 2,200 lb., lower sand, gas sand 6,857-66 ft., oil sand 6,866-94 ft., perforated 30/6,878-6,887 ft., PT 178 bbl. day 3/16-in. choke, TP 710 lb.

Duval County: Bridwell Oil Co. 1 J. A. Taft estate, NE¼ J. Poitevent Sur. 94, A-422, 1½ mi. W of Government Wells field, dry at 5,995 ft.

Taylor Refg. Co. 1-A J. M. Sepulveda, new pay discovery at Muralla, Juan A. Ruiz Survey 12, A-677, TD 4,705 ft., 5½-in. 4,705 ft., top new pay sand 3,862 ft., perforated 24/3,862-67 ft., est. 16,000,000 cu. ft. gas day on open flow, TP 1,120 lb. on ½-in. choke, no water.

Pan American Prodn. Co. 1-D Eliza Parr, new pay discovery at Thomas-Lockhart field, in GH&H Sur. 115, A-257, TD 4,910 ft., top pay sand 3,271 ft., perforated 24/3,282-87 ft. and 24/3,271-76 ft., comp. as gas well, 1,180 lb. WP through casing in this sand (Cole), top new pay sand 2,948 ft., perf. 15/3,965-70 ft., PT 95 bbl. day 5/32-in. choke, TP 425 lb., 13 per cent water.

Starr County: Geo. R. Boyle 1 Francisco Salinas Guerra, on Tr. 5, Porc. 10, 5 mi. SW of Guerra field, dry at 1,821 ft.

Webb County: Dulup Oil Co. 3 J. G. Garcia, on Blk. 34, Sec. 952, Killam subdn., Los Ojeulos Gr., 1 mi. E of Mirando City field, dry at 2,178 ft.

O. W. Killam 66 A. M. Bruni, Lot 35, Blk. 1, Mariano Arispo Gr., 2½ mi. SW of Bruni, dry at 3,500 ft.

Phillips Petr. Co. and Texas Gulf Prodng. Co. 1 A. M. Bruni estate, wildcat discovery well on Sh. 3, Jose V. Borrego Gr., Tula Pasture, 7½ mi. S SE of Pescadito, TD 8,513 ft., 5½-in. 7,297 ft., top sand 4,962 ft., perforated 40/4,962-72 ft., est. 2,250,000 cu. ft. gas day and 35 bbl. condensate daily on 7/16-in. choke

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LOWER GULF COAST COMPLETIONS

Bee County: Magnolia Petr. Co. 1 Elizabeth Ingram, in Jas. Richardson Sur. A-275, new pay for Burness-Wilcox area, TD 7,021 ft., top Slick sand 6,654-92 ft., perforated 6,660-70 ft., 50 shots, IP est. 51,200,000 cu. ft. gas per day open flow, spray condensate, 5½-in. set 6,885 ft. Showed TP 900 lb., CP 1,100 lb. when 9/64-in. choke.

Karnes County: Continental 1 W. E. Kinnear, in Brooks & Burleson Sur. 3, A-345, 3 mi. E SE of Runge, 4 mi. N of Porter field, 2½ mi. NE of Runge field disc., dry at 8,516 ft.

Refugio County: Fred M. Wood et al 1 Frank Zarsky, Sec. 45, Johnson & Pugh subdn. of Bonnie View Ranch, Guadalupe Cobian Grant, wildcat in North La-Rosa area, dry at 6,505 ft.

San Patricio County: Seaboard Oil Co. 1 E. T. Bomer, on Blk. 5-A, Cubage & Miller subdn., Juan Hart & Sons Gr., new pay discovery at Odem, top sand 6,775 ft., TD 6,783½ ft., perf. 6,781-82 ft., open hole 6,782-83½ ft., PT 102 bbl. day ⅛-in. choke, TP 125 lb., CP 1,025 lb., gravity 38.4, no water, 5½-in. set at 5,782 ft., 2-in. tbg. 6,774 ft.

MISSISSIPPI

Two Pumping Wells Completed in Eucutta Field

JACKSON, Miss.—Gulf Refining Co. and Humble Oil & Refining Co. are preparing to put on the pump for completion their respective tests in the Eucutta field of Wayne County. Neither of the tests developed sufficient pressure to complete sucessfully as flowing wells. The Gulf test, 1 G. S. Stanley, 34-10n-9w, is completing in 60 perforations at 5,125-35 ft. and the Humble well, the 1 City Bank Farmers Trust Co., 1-9n-9w, is completing in perforations in the sand at 5,050 ft. This latter well had flowed 29 bbl. oil in 18 hours on last test but commercial flow was not developed.

ALABAMA

About 15 miles to the east of the Eucutta field, and across the state line in Alabama, Hunt Oil Co. continues to test the 1 Jackson, discovery well in 2-10n-4w, Choctaw County. Total depth 5,380 ft., 5-in. and 7-in. casing set at 2,559 ft., best porosity 2,575-85 ft. The well was making some flows at last reports. It came in flowing about 2 bbl. hourly after swabbing and the flow then decreased to about 15 bbl. daily. Gravity is 17°.

MISSISSIPPI WILDCAT COMPLETIONS

Adams County: California Co. 3 National Gasoline Co. of La., Inc., 52-7n-1w, outpost in Cranfield area, top Wilcox 4,053 ft., total depth 5,380 ft., dry.

Lincoln County: California Co. 1 Granberry Smith, 38-8n-7e, Brookhaven area, dry at 7,422 ft. Top of Wilcox 3,916 ft., elev. 472 ft.

Wilkinson County: Danciger et al 1 Cunningham, 20-1n-2w, top Vicksburg 4,762 ft., Cockfield 5,140 ft., Cane River 6,331 ft., Tallahatta 6,610 ft., Wilcox 6,698 ft. Took SWS in Wilcox.

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EASTERN TEXAS

Fourth Producing Horizon At New Hope Field

DALLAS, Tex. — Production from the Lower Travis Peak sand has been opened in the New Hope field of Franklin County by Tide Water Associated Oil Co. and Seaboard Oil Co. 1 J. P. Campbell, northeast side of the field. This well perforated opposite the lower Travis Peak sand 8,156-90 ft., and tested good for 224 bbl. per day, 53-gravity, through 9/64-in. choke. The Bacon pay, Rodessa horizon, was also perforated at 7,900-59 ft., and tested 259 bbl. per day through 9/64-in. choke. This gives the field four pays, two in the Rodessa and two in the Travis Peak.

Navarro County. — Three different perforations failed to develop production in Brown & Wheeler et al 1 Guy Gibson, wildcat in Fontenoy Survey, near Freestone County line.

Smith County.—Pump was being installed on Arkansas Fuel Oil 1 Priscilla Marsh, T. M. Hawkins Survey, after it swabbed 10 bbl. oil per hour through perforations at 7,080-7,118 ft., total depth 7,377 ft. The oil tests 21° gravity. The company has staked 2 Marsh, 1,600 ft. from west, 467 ft. from north, T. M. Hawkins Survey. Sun Oil 1 Chisum, discovery well in the area, is still testing after perforating opposite Paluxy sand 6,972-7,025 ft.

EAST TEXAS WILDCAT COMPLETIONS

Anderson County: E. B. Germany 1 Bently, 3,500 ft. from W'ly W, 467 ft. from N line, N. Addison Sur., 1¼ mi. NW Trinidad, elev. 304 ft., Pecan Gap 2,037-2,220 ft., Austin 2,890-3,335 ft., dry at TD 3,791 ft.

Hopkins County: J. C. Benedum 1 J. J. Spencer, 715 ft. from S, 665 ft. from W, John O. Halbert Sur., 3½ mi. E-NE Sulphur Springs, elev. 441 ft., Pecan Gap 1,735 ft., Austin 3,248 ft., Woodbine 3,821 ft., Goodland 5,387 ft., Paluxy 5,452 ft., Glenrose 5,846 ft., Massive anhydrite 6,680 ft., Travis Peak 7,287 ft., dry at TD 7,387 ft.

(Week ended February 19)

Anderson County: V. J. Myers 1 P.D.C. Ball est., M. R. Palacios Sur., 6 mi. W Tennessee Colony, Navarro 3,312-22 ft., Pecan Gap 4,164-74 ft., dry at TD 4,178 ft.

Bowie County: Barnsdall Oil 1 Louis Heilborn, 330 ft. from N, 467 ft. from E, 47-ac. tract, or 7,500 ft. from E, 550 ft. from

LEGAL

UNITED STATES DEPARTMENT OF AGRICULTURE, Forest Service, Jackson, Mississippi, February 25, 1944. Sealed bids in triplicate will be received until 2:00 P.M. Central Time, March 27, 1944, and then publicly opened, offering bonus for operating rights in connection with gas and oil leases on national forest land located in Township 7 North, Range 9 West, Sections 5, 6, 7, 8, 17, 18, 19, and 20, in Wayne County, Mississippi, containing in all approximately 2,499 acres. Award of lease will be made only to bidder who can show sufficient experience and financial resources and proven citizenship. Interested parties may obtain bid documents, lease forms and operating regulations from the Forest Supervisor, Masonic Building, Jackson Mississippi.

S. M. H. Janes Sur., 2 mi. SW Elan, elev. 295 ft., Pecan Gap 1,720 ft., Woodbine 2,736 ft., Paluxy 3,001 ft., Glen Rose 3,339 ft., Massive anhydrite 4,487-4,616 ft., Pettit 5,222 ft., Travis Peak 5,305 ft. Cotton Valley 6,216 ft., Buckner 7,472 ft., Smackover 7,690 ft., dry at TD 7,836 ft.

Hunt County: Hollandsworth Drlg. Co. and W. F. Nenney 1 John Hancock Mutual Life Ins. Co., 330 ft. from S, 1,148 ft. from W, 60-ac. tract, 1,148 ft. E, 1,299 ft. S of N'ly NW cor. J. H. Handlin Sur., 2 mi. NE Cash, Pecan Gap 870 ft., base Austin 2,240 ft., Woodbine 2,710 ft., dry at TD 2,733 ft.

OHIO, KENTUCKY

Industrial Gets Production From Medina Sand

ZANESVILLE, Ohio. — Production from the Medina sand was found by the Industrial Gas on the Derwacter tract in Section 33, Salt Creek Township, Muskingum County, while endeavoring to extend their Philo gas pool. The Clinton at 4,275-4,316 ft. had only a show of gas, the Medina at 4,379-4,384 ft. produced 50 bbl.

An Oriskany well estimated at 2,000,000 cu. ft. was discovered by the Wiser Oil Co. while drilling for Clinton on the Salyards tract in Lot 38, Bath Township, Summit County.

OHIO WILDCAT COMPLETIONS

Coshocton County, Crawford Township: H. K. Porter 1 Albert Barkman, Sec. 8, Clinton 4,234, dry, TD 4,379 ft.

Cuyahoga County, Brecksville Township: Hanley & Bird 1 E. G. Wrobbel, Lot 16, Clinton 3,345 ft., dry, TD 3,518 ft.

Gallia County, Morgan Township: Ohio Fuel 1 Kenneth Ward, Sec. 17, Injun 773-906 ft., dry, TD 906 ft.

Lorain County, Penfield Township: Belmont Quadrangle 1 R. O. Biggs, Lot 2, Clinton 2,444 ft., dry, TD 2,675 ft.

WESTERN KENTUCKY

OWENSBORO, Ky. — Texas Co., Ashland Oil & Refining Co. et al appear to have opened a new productive spot in Union County with their 1 Culvert heirs, 2 miles almost due north of Robinsonville. A 1-hour drill-stem test of Levias lime, 2,523-36 ft., developed gas in 13 minutes and 1,700 ft. of clean oil, 40 ft. of oil-cut mud and no water. Casing has been set. The test is 1½ miles from other production.

WESTERN KENTUCKY WILDCAT COMPLETIONS

Hopkins County: Sohio-Ryan 1 Felker, C. Holman Survey, dry at 1,597 ft., had gas in Tar Springs sand at 1,173-97 ft., TD 1,957 ft.

INDIANA

EVANSVILLE, Ind.—The only completion of importance in Indiana during the week was an old producing well plugged back from a total depth of 2,899 ft. to 2,840 ft., and Aux Vases sand at 2,790-2,812 ft. shot with 100 qt. of nitroglycerin. The well flowed 652 bbl. of oil in 24 hours, and 501 bbl. the second day. No wildcat completions were reported.

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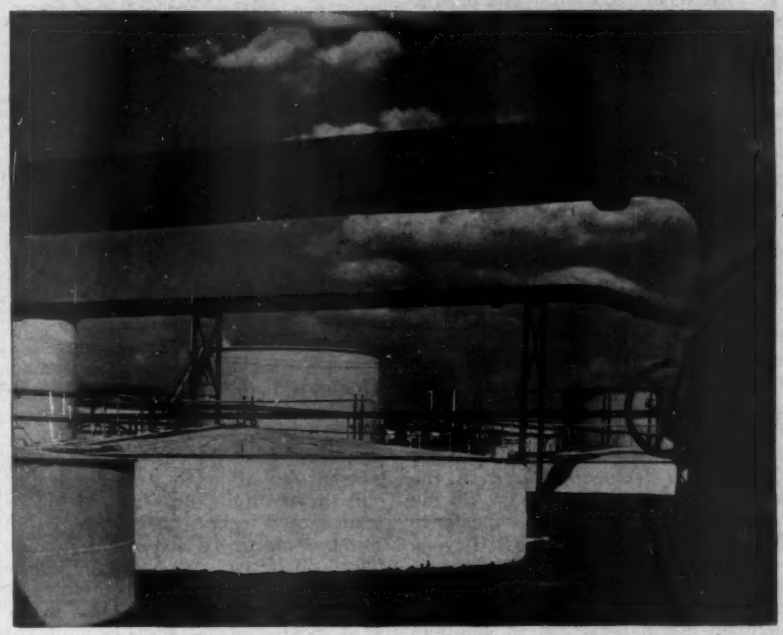

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CALIFORNIA

Richfield Discovers New Gas Field in Glenn County

LOS ANGELES, Calif.—The production committee has increased the allowable of several California fields in response to increased quotas set by PAW. As a consequence state production of crude oil during the next several months will be higher than had been anticipated.

No immediate effect will be noticed and it is quite likely that fields given increased quotas will be watched closely as it has been a long time since California crude-oil production has exceeded 800,000 bbl. daily. Unless some important discoveries are made in the near future, the decline in crude-oil reserves during 1944 will be the largest ever recorded.

Richfield has discovered a new gas field in Glenn County with production from rocks of Eocene age. Several gas fields have been discovered in the north central part of the state during the past year but their importance will not be determined until they go on commercial production for a sustained period. Rio Vista gas field has been supplying a large part of the demand for natural gas in the San Francisco Bay region augmented by imports from San Joaquin Valley fields and other gas fields in the central part of the state. Northern gas fields have not been provided with pipe-line outlets and there are no indications that pipe-line construction will get under way in the near future. Due to limited development, the importance of these recent gas discoveries is conjectural.

Standard Oil Co. of California has spudded in what may later prove to be the deepest well in the world unless commercial production is developed sooner as it is the present intention of the company to keep on drilling as long as possibilities exist. Standard's potential record breaker is a joint undertaking with Ethel D Co. on the Thirty-five anticline in the Midway-Sunset field and it is expected to be drilled to 15,000 ft. if conditions justify. That deep drilling has been expected is evidenced by the fact that the heaviest and largest equipment has been installed. Production to date has come principally from the Etchegoin of Pliocene age at depths ranging from 2,000 to 5,000 ft. It is the present intention to prospect below this formation and the Monterey shales of Miocene age in search of either Miocene or Eocene production. This projected deep test is being drilled on property produced for years by Ethel D Co. from shallow oil sands. It is located in 36-12n-24w. Standard holds practically all of the potentially productive acreage adjacent to the well and should, therefore, benefit to the greatest extent.

In Los Angeles Basin, interest continues to center in Barnsdall's wildcat in the Coyote district due to several oil sands found during the course of drilling. This wildcat looks quite promising although oil is not yet running in the tank. Standard's 105 Baldwin-Cienega in the Inglewood field is the deepest drilled hole in that district but with the bit going ahead below 11,500 ft. it is evident that nothing favorable has yet been cored.

CALIFORNIA WILDCAT COMPLETIONS

Afton wildcat district, Glenn County: Richfield 1-1 Afton Comm., 34-19n-1w, flowed 6,200,000 cu. ft. gas, no oil, 42/64-in. bean, pressures 350/965 lb., shut-in pressures 1,120/1,120 lb., TD 5,943 ft., PB 3,190 ft., gun perf. 2,648-60 ft., base Tehama 1,581 ft., Capay shale 1,814 ft., Eocene gas sand 2,648-82 ft., Cretaceous 3,439 ft.

Kern River wildcat district, Kern County: E. A. Bender, 1 Kern, 6-29s-28e, dry at TD 1,922 ft., top of oil sand 1,600 ft., base oil stained sand 1,828 ft., boiled water with only scum of oil.

Seaboard 2 Fuhrman, 21-28s-28e, dry in barren gray sand, TD 3,328 ft., Santa Margarita sand 590 ft., Round Mountain silt 1,200 ft., Olcese zone 1,290 ft., Jewett zone 2,346 ft., Pyramid Hills sand 3,252 ft., Vedder zone of Miocene age 3,275 ft. was barren.

Richgrove wildcat district, Kern County: Western Gulf 1 Richgrove Comm., 4-25s-27e, dry in basement granite, TD 2,954 ft., Olcese sand 2,025 ft., Pyramid Hills sand 2,625 ft., Vedder zone of Miocene age, 2,761 ft., was barren.

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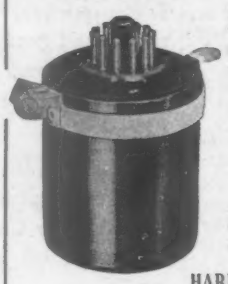

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Wildcat Completions and Discoveries

	Week ended February 26, 1944					Cumulative total for 1944				
	Oil	Distillate	Gas	Dry	Total	Oil	Distillate	Gas	Dry	Total
Ohio	0	0	0	4	4	0	0	3	11	14
Indiana	0	0	0	0	0	0	0	0	0	3
Kentucky	0	0	0	1	1	0	0	0	11	11
Illinois	0	0	0	8	8	3	0	0	48	51
Michigan	0	0	0	5	5	1	0	0	33	34
Kansas	3	0	0	7	10	7	0	0	52	59
Nebraska-Missouri-Iowa	0	0	0	0	0	0	0	0	6	6
Oklahoma	4	0	1	4	9	8	0	4	27	39
Texas:										
North Central	0	0	0	1	1	5	0	0	44	*49
West	0	0	0	3	3	5	0	0	23	*28
Panhandle	0	0	0	1	1	0	0	0	2	2
East	0	0	0	2	2	0	0	0	25	25
Gulf Coast	3	0	1	2	6	13	3	3	33	52
Southwest	1	2	2	4	9	7	2	5	36	50
Total	4	2	3	13	22	30	5	8	163	206
Louisiana:										
North	0	0	0	2	2	1	0	0	6	7
Gulf Coast	0	0	0	3	3	1	3	0	13	17
Total	0	0	0	5	5	2	3	0	19	24
Arkansas	0	0	0	2	2	1	0	0	9	10
Mississippi and Southeast	0	0	0	3	3	3	0	0	17	20
Montana	0	0	0	0	0	1	0	0	2	3
Wyoming	0	0	0	1	1	0	0	0	3	3
Colorado, Utah	0	0	0	0	0	1	0	0	2	3
New Mexico	0	0	0	3	3	0	0	0	10	*10
California	0	0	1	3	4	1	0	4	21	26
Total United States	11	2	5	59	77	58	8	19	437	522
Total previous week	14	1	4	50	67					

*Revised.

NEW discoveries have run comparatively high the past two weeks, but the figure has been bolstered by a number of new pay zones added to existing pools.

In the Mid-Continent area, Oklahoma and Kansas completed seven new oil discoveries, two in each state being classed as large wells. Gulf Oil Corp. completed its 1943 discovery in Washita County after several months of testing. This well, although on the southwest flank of the Anadarko Basin, may prove to be the forerunner of extensive drilling in this area. A second test is under way some 3 miles to the east.

In Rooks County, Kansas, Cities Service Oil Co. completed its 1 Sikes at an estimated 1,300 bbl. of oil a day in the Arbuckle at 3,647-50 ft. Location is an undrilled area and near the town of Zurich. It is one of four recent discoveries in the county.

Two large flowing wells were completed in the Lower Gulf Coast and South Texas areas. In Brooks County, Humble Oil & Gas Co. 1 Scott & Hopper opened the Scott & Hopper field, 4 miles northeast of the Alta Mesa pool, with a potential of 178 bbl. of oil a day through 7/8-in choke. Pay zone is an oil sand at 6,878-87 ft.

KANSAS

Producing Area Extended North of Barton Arch

GOUGH DAVIS 1 Klaussen, SW SW SW 27-12-14w, was a promising new Lansing-Kansas City lime discovery for northwest Russell County. Top of the Lansing was 2,816 ft. Perforations at 2,854-61 ft. and 1,000 gal. of acid yielded from 10 to 13 bbl. of oil an hour, swabbing with a small amount of water. Total depth is 3,155 ft., in the Arbuckle which was topped at 3,131 ft. Location of the new well is about 5 miles north of the Russell pool and is a considerable extension north of Arbuckle production along the Barton Arch.

Also in Russell County, Nadel & Gussman 1 Janne, W½ SW NW 24-15-12w, pumped 143 bbl. of oil a day in Arbuckle lime at 3,327-30 ft. Seven barrels of oil and 75 bbl. of water was pumped after perforating and acidizing at 3,088-3,106 ft. These perforations were squeezed and the hole cleaned out to 3,327 ft. Location is between the Driscoll and Gustason pools in southeastern corner of the county.

KANSAS WILDCAT COMPLETIONS

Barber County: Great Lakes Carbon 1 Davenport, SE SW 34-31-11w, dry, TD 4,445 ft., Mississippi chat 4,395 ft.

Deep Rock 1-B Skinner, C W½ NW SE 29-31-14w, 278 bbl. per day, TD 4,640 ft., Viola 4,624 ft.

Barton County: F. C. Koch 1-B Schauf, C N½ SW SE 2-16-12w, 30 bbl. per day, TD 3,344 ft., Lansing 3,070 ft., Arbuckle 3,337 ft.

Doniphan County: Clifton Gall 1 Caudle, NW NW SE 18-3-20e, dry, TD 2,041 ft., Hunton lime 2,033 ft.

Pratt County: Bridgeport 1 Wittman, SW SW SW SE 34-27-14w, dry, TD 4,707 ft., Viola 4,468 ft., Arbuckle 4,665 ft.

Reno County: British-American 1 Breitenback, NE NE NE 3-26-5w, dry, TD 4,135 ft., Viola 3,977 ft., Arbuckle 4,091 ft.

Rooks County: Cities Service 1 Sikes, SW SW SE 27-9-19w, est. 1,300 bbl. per day, TD 3,688 ft., Lansing 3,383 ft., base Kansas City 3,600 ft., Arbuckle 3,623 ft.

Sedgwick County: Beech Aircraft 1 Streiff, NE SE NW, dry, TD 4,445 ft., Mississippi lime 3,010 ft., Simpson 3,308 ft.

Sheridan County: Continental 1 C. A. Croffoot, SW SW SE 35-7-26w, dry, TD 3,925 ft., Lansing 3,744 ft.

Stafford County: Isern Bros. 1 Lanterman, NW NE SE 11-21-12w, dry, TD 3,630 ft., Lansing 3,112 ft., conglomerate 3,471 ft.

Trego County: Lion & Auto Ordnance 1 Walsh, NE NE SW 5-11-25w, dry, TD 4,621 ft., Viola 4,463 ft., Arbuckle 4,513 ft.

LA.-ARK.

Tide Water Opens Second Pool in Columbia County

MAGNOLIA, Ark.—Tide Water Associated Oil Co. was nearing completion at its 1 L. H. Pearce in 10-18s-20w, 6 miles west of the Atlanta pool, and 3 miles west of its recent discovery at West Atlanta. The new well flowed 207 bbl. of 52.5-gravity oil a day through tubing choke in Smackover lime at 8,282-87 ft. Tide Water's West Atlanta discovery was a dual completion in the Cotton Valley at 7,210-16 ft. and the Smackover at 8,294-8,300 ft.

ARKANSAS WILDCAT COMPLETIONS

Clay County: C. C. Alford 1 Crockett, SW NW 23-19n-7e, dry, TD 390 ft.

E. E. Young et al 1 Nichols, NW NW 35-21n-8e, dry, TD 650 ft.

NORTH LOUISIANA WILDCAT COMPLETIONS

DeSoto Parish: H. C. McCalman 1 Williams, SW SW NW 6-10n-12w, dry, TD 1,957 ft.

Webster Parish: W. E. Stewart 1 Woodard-Walker, SE SW 9-17n-8w, dry, TD 3,626 ft.

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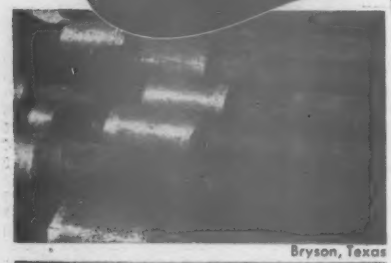
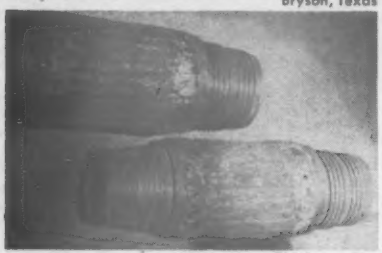


Bryson, Texas



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STOODY ENGINEERING BULLETIN

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Among the

Drilling Contractors

Rowe Brothers Drilling Co., Wichita Falls, Tex., have contract to drill Hassie Hunt 1 Aisley Martin, in J. Parks Survey, 10 miles northwest of Denton, Denton County. It is to be an Ellenburger test in an area just west of the schist uplift which traverses northwest Denton and southwest Cooke County.

Allied Well Service, Houston, Tex., has contract to work over and dual-complete two Stanolind wells in the West Hackberry field of Cameron Parish, Louisiana. These wells are the 59 State-Black Lake, Lease 42, 17-12s-10w, and 22-B School Board, 16-12s-10w.

Loffland Bros. have been awarded contract to drill Pure Oil Co. 16 Alliance Trust Co., 33-11s-1w, on southwest flank of Gueydan area of Vermilion Parish, Louisiana. Loffland recently completed the 15 Alliance for Pure in the same area.

Cron & Gracey has been awarded contract to drill two more tests for Barnsdall Oil Co. in the Gibson field of Terrebonne Parish, Louisiana, these being the 2 and 3 Mrs. Rosemonde Kuntz, both in 34-17s-15e. Both are contracted to 9,500 ft.

Brewster-Bartle of Houston, Tex., is rigging up the 2 Roberts Co., wildcat in Shepherd area of San Jacinto County, Texas, for Navarro Oil Co. This is a Wilcox test in Uriah Gibson Survey.

M. L. Massingill, San Antonio, Tex., has been awarded contract to drill The Texas Co. 1-B T. T. East, wildcat in Section 6, Rafael de la Pena "Las Moritas" grant, north of Colorado field and a mile south of Neuhaus field in Jim Hogg County, Texas. Pits are completed and derrick up for this 4,500-ft. test.

Two States Drilling Co. has been awarded contract by Ohio Oil Co. for its 1 Heffelfinger & Hermanson, wildcat in P. Burnett Survey, about 4 miles northeast of Blessing in Matagorda County, Texas. It is a 9,900-ft. test.

Lupher Drilling Co. is the drilling contractor on the J. Fred Beck 1 H. Rehkopf, in SW NW SW 21-18n-10w, Osceola County, Michigan.

J. W. Lang is the drilling contractor on the Michigan Devonian Petroleum Co. and J. W. Lang Co. 2 John J. Boeve, in NE SW NW 1-4n-15w, Allegan County, Michigan.

Union Rotary Corp. has been awarded drilling contract on the Sun Oil Co. 4 William H. Richardson, in C S½ NE NW 23-18n-9w, Osceola County, Michigan.

General Petroleums, Ltd., of Calgary, Alta, has received a contract from Sweet Grass Oils, Ltd., for the drilling of 15 wells of from 1,800 to 1,950 ft. in the Vermilion field, eastern Alberta.

Mercury Drilling Co., Tulsa, has set surface pipe on Buttram Petroleum Co. 2 Balthazor, in C NW NE 23-9s-21w, Graham County, Kansas. The same contractors are moving in drill-

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ing-in equipment to complete Buttram 1 well on the same lease, which well is running structurally high and appears to provide a ¼-mile extension to the Morel field. Mercury is also drilling Phillips Petroleum Co. 1 Thole, a wildcat in 23-23s-12w, Stafford County, Kansas.

Summit Drilling Co. was moving materials and rigging up at Deep Rock Oil Corp. 1 Humphreys in NE SE SE 12-25n-1w, a wildcat location some 4 miles north of the Tonkawa field in Kay County, Oklahoma.

Copeland & Williams has contract for Ohio Oil Co. 1 Collingswood, a wildcat in the SE SE SE 12-26-7w, some 14 miles west of the Hilger pool, in Reno County, Kansas. Ohio was said to own a 4,000-acre block.

Two States Drilling Co. has been awarded drilling contract on Ohio Co. 7 O. E. Boettcher, in C S½ SW NE 33-18n-9w, Osceola County, Michigan.

Requirements Explained for Securing Furloughs From Army of Key Employes

The headquarters office of the American Association of Oilwell Drilling Contractors reports that it has had many requests for information on the proper procedure for obtaining furloughs from the Army of certain key employes vital, as civilians, to the war effort. The Eighth Service Command, Dallas, Tex., has informed the association that government bulletins issued sometime ago are still applicable.

According to the bulletins, if an employer can show that the drafting of an individual employe has caused some interference with the war program because an employer has been unable to secure and train a competent replacement, it is possible to have the original draftee furloughed from the Army for a specific period of time not to exceed 6 months. At the end of 6 months' furlough, however, application can be made for an extension of the time of furlough.

The information which is required to secure the release of such persons must establish to the satisfaction of the War Department that the soldier is a key man specifically needed in war production or in services essential to the war effort, that there is a shortage of workers in this category and that it is impossible to secure a replacement.

It must be established that the firm seeking soldier's release has made every effort to solve its own manpower problems and has replaced employes who are eligible for induction by full utilization of available manpower facilities.

The employer must agree to immediately employ the soldier upon his release from military service.

A separate request addressed directly to the War Department, Labor Branch, Industrial Personnel Division, Headquarters, Army Service Forces, Washington, D. C., will be submitted in the case of each soldier for whom release is requested. Each request will be:

(a) Explicit in showing why the soldier's services are indispensable and explain in detail what duties he will perform.

(b) Initiated and executed under oath by the responsible head of the firm seeking the soldier's release.

(c) Submitted in triplicate on the firm's letterhead in the form of an affidavit, and executed before a notary public.

Owing to the precise nature of the information the employer needs to furnish, and to the necessity for following a certain prescribed form, a copy of the instruction should be obtained before attempting to make application for the soldier's release. The instruction can be obtained from the American Association of Oilwell Drilling Contractors, 1410 Gulf State Building, Dallas, Tex.

It should be pointed out that this procedure applies to enlisted men only, and that no releases will be granted to enlisted men who are presumably overseas or whose transfer out of the country is imminent.

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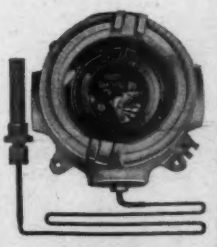
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PERSONALS

He Knows the Whole Road Up—He Has Traveled It

LAYING aside his lieutenant's uniform in 1919 after serving in the Army Air Corps almost 2 years, A. E. Chester donned the overalls of a roustabout in Magnolia Petroleum Co.'s Comanche district of the Hog Creek-Desdemona field, Texas, and went to work at $4.50 a day, hours unlimited. A native of Nashville, Tenn., he had left Vanderbilt University in his junior year to get into World War I.

It's a long road from rookie roustabout in 1919 to assistant manager of Magnolia's production division in 1944. Roustabout, cleanout helper, driller foreman, district superintendent, division superintendent — and every promotion earned by hard work. Incidentally, 21 months in the Army had taught the young man how to take orders as well as give them.

A guide can't take another where he himself hasn't been, but those who know Chester say he is a good guide and will continue to be a good one. He knows the road. He has traveled it himself.

Paul B. Cartledge, who has had extensive drilling experience in both this country and South America, planned to leave for Colombia early in March to serve as drilling foreman for Tropical Oil Co. in the Barranca Bermeja district.

George S. Carr, who recently received a medical discharge from the U. S. Army after being wounded in Sicily and again in the Salerno invasion, as a paratrooper, has joined Texas Pacific Coal & Oil Co. as a scout at Midland, Tex., where he resided before entering war service.

John R. Scott, who was district manager of the land and lease department of Skelly Oil Co. in Shreveport, La., has joined the petroleum department of Republic National Bank in Dallas, Tex.

Ford M. Graham is landman of an office which Humble Oil & Refining Co. has opened in Mobile, Ala. **E. A. Murchison** is geologist, and **B. W. Samuel** and **Al Draper** are geological scouts.

C. R. Bates, district manager for Magnolia Petroleum Co. in Shreveport, La., has been named chairman of the Red Cross war fund campaign in that district.

William S. Bissell, engineer-draftsman at the Wilmington, Calif., refinery of Shell Oil Co., Inc., has been transferred to the Los Angeles office as pipe-line engineer. **Dana S. Detrick,** draftsman at Wilmington, has been made assistant geologist in the company's coastal division.

John M. Mouser, for several years district landman for Midstates Oil Corp. in Houston, Tex., is manager of the office which that company is opening in Wichita Falls as headquarters for its new North Texas division.

Richard V. Hughes, of the Petroleum Administration for War staff in Washington, D. C., has been chosen director of research in production by Pennsylvania Grade Crude Oil Association. Hughes was to take up his duties March 1, working in cooperation with **J. Paul Jones,** Bradford, Pa., recently named director of production.

Dr. Vladimir Haensel, research chemist for Universal Oil Products Co., Chicago, has been named by Chicago Junior Association of Commerce to receive the award presented annually to the Chicago man between the ages of 21 and 38 adjudged to have made the most important contribution to science, industry, and the welfare of the nation during the year. Doctor Haensel, 28, was selected for the 1943 honor as the inventor of a process for making triptane, the most powerful motor fuel known for use in internal-combustion engines.

Clyde Morningstar, who formerly did geological field work for Stanolind Oil & Gas Co., is now employed as a scout for the company, working out of Midland, Tex.

Frank G. Clark, head of the boilermakers and welders department of Standard Oil Co. of Louisiana's refinery at Baton Rouge, La., has been selected by National Safety Council to receive its Safety Ace award, including a $100 war bond, "for outstanding safety achievements."

John H. Lewin, who has figured in important petroleum litigation, has resigned as first assistant to the assistant attorney general in charge of the antitrust division of Department

L. C. Stevens, Shell Co. of Ecuador, Ltd.; S. J. Veenstra, Asiatic Petroleum Co., Ltd.; P. K. Ozinga, Shell of Ecuador, and F. G. Willson, United British Oilfields of Trinidad, Ltd., were among the foreign oil country guests at a recent meeting of the New York Nomads

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of Justice. Among major antitrust proceedings which he handled were the Madison oil cases (1936-39) and the Ethyl Gasoline Corp. case (1938).

Hubert E. Armitage, of Cheyenne, Wyo., vice president of the Frontier Refining Co., and Evelyn G. Bridgman, of Fairmont, Neb., were married in Cheyenne on February 18.

A. J. Smith has been elected vice president of Calumet Refining Co., Chicago, to take the place of the late Thomas A. Telfer. Officers reelected are **Van S. Welch,** president; **R. S. Watt,** secretary-treasurer; **Guy N. Kinney,** assistant treasurer.

Thomas Jack Williams, on military leave from The Shamrock Oil & Gas Corp., Amarillo, Tex., has been promoted from first lieutenant to captain in the Army Air Forces. He is stationed at Punta Gorda, Fla.

Edward T. Benson, district geologist for Tide Water Associated Oil Co. in Indiana, has been transferred to the company's Houston, Tex., office.

Maurice Miesse, formerly a scout for Phillips Petroleum Co. in the Oklahoma City, Okla., district, is now district landman for the company in Tallahassee, Fla.

Glen C. Wooley, district geologist and landman for Transwestern Oil Co. at Wichita, Kans., will be in charge of an office which Transwestern plans to open this month in Jackson, Miss. His assistant, **Frank Mittner,** will succeed him at Wichita.

D. S. Fletcher, of Fletcher Oil Co.; **J. H. Lewis,** of Sunset Oil Co., and **C. B. Limbocker,** of Hancock Oil Co., were recently elected directors of the Independent Refiners' Association of California at the eighth annual meeting of the association. Officers, who are also members of the board are **C. A. Johnson,** president; **Henry Brown** and **B. E. Devore,** vice presidents, and **A. M. Lockhart,** secretary-treasurer.

Dr. E. DeGolyer, consultant to Petroleum Reserves Corp., who recently returned from a mission into the oil provinces of Turkey, Iran, Iraq, and Saudi Arabia, has gone to his home in Dallas, Tex., for a rest.

J. F. Thomas has been chosen vice president in charge of Illinois operations for Frontier Fuel Oil Co., of Buffalo, N. Y., and will have offices in Evansville, Ind.

Arthur D. Small, engineer in charge of secondary-recovery operations conducted by a group of Oklahoma oil producers until he entered the Army as a major in August 1942, has been

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promoted to lieutenant-colonel. Colonel Small, who is stationed in Washington, D. C., was for 7 years chief production engineer in the Dutch East Indies for Standard-Vacuum Oil Co.

C. W. Hooper, field gager for Shell Pipe Line Corp. at McCamey, Tex., was awarded the President's Medal of National Safety Council last week for saving the life of **W. G. Collum,** a Gulf Oil Corp. pumper, who fell 15 ft. from an oil tank when overcome by gas.

R. T. Mann becomes the purchasing agent of War Emergency Pipelines, Inc., after service with the company as assistant purchasing agent. Formerly he was with Panhandle Refining Co., Wichita Falls, Tex. He succeeds **W. H. McEachern** who resigned recently. Before joining WEP, McEachern was with Standard Oil Co. of New Jersey.

E. G. (Ty) Dahlgren, who has been secretary of the research committee of Interstate Oil Compact Commission, has been named assistant secretary of the commission.

H. T. Morian, one of the first persons to buy oil from the Drake well, observed his ninety-fifth birthday at his home in Bradford, Pa., recently. Virtually all his life has been spent in the oil fields, largely as a contractor. He drilled more than 600 wells.

George M. Harrison, landman, and **F. F. Mellen,** geologist, are in charge of an office opened by British American Oil Producing Co. in Jackson, Miss.

Flavel B. Pepper, employed by The Shamrock Oil & Gas Corp. since 1933, has been made assistant refinery foreman at the company's plant at Sunray, Tex.

H. A. Koechling, assistant comptroller of Standard Oil Co. of New Jersey, has been promoted to comptroller and elected to the board of directors. **Walter Schaefer,** formerly comptroller of Standard Oil Co. of New Jersey and assistant comptroller of Standard Oil Co. (New Jersey), resigned the former position to give all his time to the latter. Koechling joined the Standard in 1917 as a clerk.

A. A. Vendetti, process superintendent, and **Jay Olvey,** chief chemist, at the new Frontier Refining Co. plant at Cheyenne, Wyo., conducted a discussion of the use of hydrofluoric acid in the manufacture of 100-octane gasoline at a luncheon last week attended by Cheyenne physicians, hospital superintendents and others. The hydrofluoric acid to be used commercially in Cheyenne has arrived at the refinery and the purpose was to acquaint the medical profession with approved methods of treatment for acid burns. **Mrs. Ferne Cielak,** an industrial registered nurse, is now on duty at the plant.

J. A. Mull, district geologist for Superior Oil Co. of California in Oklahoma and Kansas, with offices in Wichita, Kans., will make Oklahoma City his headquarters hereafter. His assistant, **Delbert Costa,** will stay in Wichita.

Robert B. Campbell, formerly president of Peninsular Oil & Refining Co., was elected vice president of the newly organized Southeastern Geological Society at its organization meeting in Tallahassee, Fla.

Carl V. Benz, for 11 years connected with the George W. Strake oil interests in Houston, Tex., has opened offices in that city as a consulting geochemist and petroleum engineer. For 5 years he was general superintendent for Strake.

Warren J. Barrett, who was petroleum engineer for Humble Oil & Refining Co. at Roanoke, La., has been transferred to the Darrow district, Geismar, La. He takes the place of **John A. Diodene,** who, in turn, has been assigned to the post formerly held by Barrett.

TO ALL

NATURAL GASOLINE MEN

GREETINGS

FROM THE

NATURAL GASOLINE SUPPLY MEN'S ASSOCIATION

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TWENTY-THIRD ANNUAL CONVENTION

of the

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April 12-14, Baker Hotel, Dallas, Texas

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Midwest Piping & Supply Company
Moorlane Company
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National Tank Company
Naylor Pipe Company
The Oil and Gas Journal
Parkhill-Wade
The Petroleum Engineer
Petroleum Engineering, Inc.
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Taylor Instrument Companies
Tulsa Boiler & Machinery Company
Vinson Supply Company
Vortox Manufacturing Company
Walco Engineering & Construction Co.
Walworth Company
Westcott & Greis, Inc.
Woobank Pump & Machinery Co.
World Petroleum
Worthington Pump & Machinery Co.
Wyatt Metal & Boiler Works
John Zink Company

Market Developments

PRIORITY control over deliveries of fuel oil to six federal agencies was made nation wide last week. The Petroleum Administration for War amended Petroleum Distribution Order 14 requiring all suppliers in the nation to make preferential deliveries to the Army, Navy, Coast Guard, Maritime Commission, War Shipping Administration and Foreign Economic Administration. Principal effect of the action will be to assure these agencies adequate supplies of oil at coastal ports, particularly on the Pacific Coast.

Maladjustment of fuel-oil distribution with reference to requirements of the military and related agencies was not common to the entire country. The nation-wide order, however, will influence distribution of the relatively plentiful supply of fuel oils at certain interior refining centers to the coastal ports. This influence will be felt through overland deliveries to coastal points and in the buying habits of seaboard operators.

A gradual tightening of the petroleum-products-supply situation on the East Coast is apparent with virtually all the major products being affected. Contributing factors are the decline in tank-car shipments and the delayed opening of the 20-in. products line together with the probability that the latter will deliver less than expected.

Kerosene, which has been in a tight position since the beginning of the heating season, continues as the most critical product. Some severe local shortages have been reported but the mild weather that prevailed last week eased the demand for heating purposes and provided some relief.

Residual fuel oil, yield of which has been curtailed by the concentration of catalytic cracking in the manufacture of light products, has become somewhat tighter.

Eleven operating companies in the Gulf Coast Refiners Association increased their crude-oil runs to 113,557 bbl. daily during the first part of February, an increase of about 33,000 bbl. compared to the rate at this time a year ago.

Stocks of all grades of gasoline in the stocks of the 11 coastal companies increased the first half of February by 187,941 bbl., reaching a total of 1,658,492 bbl. Normally, the same plants carry motor-fuel inventory of about 2,500,000 bbl. Kerosene stocks are practically static at 200,000 bbl., representing minimum working inventory. Diesel gas-oil stocks were but 60,214 bbl. on February 15 compared with stocks of several hundred thousand barrels a year ago. Gas oil used as light fuel oil and cracking-plant stocks decreased 57,830 bbl. in the first half of February to 942,118 bbl., reflecting the movement of this type of product to the West Coast by tank cars. Heavy fuel-oil stocks are 627,032 bbl. higher than they were a year ago largely because of the increased rate of refinery operation without a compensating rise in consumption of these products.

Mid-Continent refiners described themselves as "snowed under" with orders from agricultural areas for gasoline to be delivered in March. This influx of orders had the effect of stiffening the motor-fuel market.

No relaxation was visible in the tightness which has characterized the kerosene market for weeks, all available tank cars being employed in moving this product to the East Coast. Need for more tank cars continued.

A.P.I. Refinery Report

Week Ended February 19, 1944

	Dly. crude runs to stills	Stocks: Gasoline	Stocks: Residual	Stocks: Gas oil
Appalachian	150	3,266	385	1,034
Ind., Ill. Ky.	768	18,432	3,011	5,921
Okla., Kan., Mo.	348	7,881	1,250	1,696
Censored area*	2,138	36,919	15,184	15,388
Rockies	104	1,993	612	385
California	832	15,440	32,523	9,225
Total 2-19-44	4,340	83,931	52,965	33,709
Total 2-12-44	4,228	82,322	52,453	34,854
Total 2-20-43	3,668	91,823	70,371	36,122

*Reports combined on East Coast, Texas Gulf Coast, Louisiana-Arkansas and Inland Texas at request of PAW.

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
February 19, 1944	237,511,000
February 12, 1944	238,206,000
February 20, 1943	234,562,000

*Excludes unrefinable stocks in California.

REFINERY PRICE SUMMARY

(Prices as of February 29, 1944)

Quotations are f.o.b. plant in cars and in cents per gallon except where otherwise noted. They are exclusive of the federal excise taxes of 1.5 cents a gallon on gasoline and 4.5 cents a gallon on lubricating oils, and do not include marine lighterage charges.

REFINERY GASOLINE

Octane (A.S.T.M.):	80†	72-74	68-70	63-66
Mid-Continent*	‡6.00-6.25	5.750-6.000	.....	5.625
Gulf Coast	6.00-6.50	§5.750-6.250	§5.750-6.250	§5.250-5.750
Northeast Coast	9.80	9.2	9.2	.....
California	.....	6.255-6.500	5.750-6.125	5.125-5.500

*Basis Group 3. †1939 C.F.R. (research method). ‡Inland Texas and adjoining counties in Arkansas and North Louisiana. §Unleaded.

KEROSENE AND DISTILLATE FUEL OIL

Product:	Kerosene†	No. 2	No. 3	No. 5	No. 6‡
Mid-Continent*	4.125-4.375	3.500-3.625	3.375-3.500	$0.85	$0.80-1.27
North Louisiana*	4.125-4.375	3.500-3.625	.....	.....	0.80-1.27
Pennsylvania	6.000-6.125	5.875-6.000	.....	.....	.....
California	4.500-5.500	5.500	5.500	§1.10-1.25	†1.10-1.15
Northeast Coast	6.800	6.700	1.95	1.85	
Gulf Coast	4.125	3.750-3.875	.....	1.35	0.85

*Reflecting OPA ceilings, depending on destination of shipments. †Quotations for 41-43 gravity. ‡Range depends on gravity. §Pacific Specification 300. †Pacific Specification 400.

NATURAL GASOLINE

Grades:	26-70	18-55
Oklahoma (Group 3)	4.750	5.700
North Texas	4.375	5.250
North Louisiana	4.375	5.250
California	4.875	5.500

LUBRICANTS

PENNSYLVANIA GRADE—	
Bright stock,* 10 pour point	30.5
Bright stock,* 25 pour point	25.0
Steam refined, 600	15.0
Neutral oil,† 10 pour point	34.0
Neutral oil,† 25 pour point	28-32.5

*No. 8 color, 145-155 at 210, 540-550 flash. †150 vis. at 70° F., 3 color, 400-405 flash.

MID-CONTINENT—	
Bright stock, 150-160 D, 0-10	23.00
Neutral oil,‡ 200-3	15.00

‡0 to 10 pour point.

GULF COAST—	
Pale oil, 200-3	8.75
Pale oil, 500-3½	10.00

WAX

Oklahoma, 124-126, w.c.s.	4.250
Pennsylvania, 122-124, w.c.s.	4.250
NEW YORK (in bags)—	
Refined, 130-132 (A.m.p.)	7.00
Crude, 124-126 (W.s.)	6.00

TANK-WAGON PRICES

(Gasoline prices based on regular grades in cents per gallon.)

	Dealer tank wag.	Combined tax	Kero. tank wag.
Baltimore, Md.	15.95	5.5	10.5
New York	16.10	5.5	10.1
Philadelphia	16.20	5.5	11.9
Washington, D. C.	15.20	4.5	11.3
Chicago	14.10	4.5	10.6
Cleveland, Ohio	14.50	5.5	*9.9
Atlanta, Ga.	18.90	7.5	*11.5
Denver, Colo.	14.50	5.5	11.0
San Francisco	14.50	4.5	11.5
Tulsa	16.50	7.0	8.5

*Includes 1-cent state tax.

Information supplied by "The Oil and Gas Journal"

Drill collars deserve unremitting attention. They are hard to replace in the first place, and failure in the hole leads to very expensive fishing jobs.

Two types of inspection are recommended to prevent trouble. Visual examination of the joint threads and faces each time a trip is made with the pipe will help to prevent thread failures in the hole.

Whenever a trip is made, each of the drill collar joints should be broken, examined and lubricated with the proper thread dope. Joints should always be made up tightly. It is good practice to use two more wraps of the jerk line on the cat head than the nominal thread size. Hitting the tongs handle with a sledge will show whether or not the joint is tight.

Cracks, whether fatigue or otherwise, are a prolific cause of failure. Their presence, even when exceedingly small, can, however, be quickly detected by magnetic inspection or Magnafluxing. Once detected, the remedy consists of cutting off the weakened section. If the condition is sufficiently serious, it is better to retire the collar from service.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

ARMY E NAVY

MOLYBDIC OXIDE, BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

Climax Molybdenum Company

500 Fifth Avenue • New York City

MOLY

Equipment Progress

Hand Tank Gage Introduced By Johnston & Jennings Co.

Recently introduced by the "Oceco" division of Johnston & Jennings Co., Cleveland 14, Ohio, the new Oceco "Gaugit" (pronounced gage-it) is a multiple-duty and accurate hand tank

gage, that avoids the necessity of gaging through an open hatch, with resulting loss of valuable vapors—and exposing the gager to fumes.

The equipment consists of a sampler bob with thermometer, a fingered tape guard, and a gaging tape that is reeled past a sight glass on top of the unit. Access doors are provided for both the lower and upper chambers. A gaging valve—operated with a knurled knob—isolates the upper from the lower chamber when closed, and the base of the unit is a standard 125-lb. flange, which is drilled for mounting on a standard 4-in. gate valve.

Gaging with this unit is said to be quick, easy and accurate. With both access doors closed, the gager opens the 4-in. gate valve and lowers the sampler bob into the tank, the tape guard being retained inside the gate valve to prevent the valve being closed, cutting the tape.

When that portion of the tape, where the level of the liquid in the tank is expected to be found, comes into view in the sight glass on top of the Gaugit, the gaging valve is closed with the knurled knob, thus preventing the escape of tank vapors. The tape access door is then opened, and gaging paste applied to a section of the tape. After the door has been closed again and the gaging valve reopened, the tape is reeled out slowly until the sampler bob contacts the bottom of the tank. This opens the upper valve in the sampler bob, so as to take a sample of the tank's contents as the tape is reeled in. The gager stops reeling at the point where the gaging paste has been "cut," takes the reading, then closes the gaging valve, and opens the tape access door, and wipes the tape clean of paste. After the access door has been closed and the gaging valve opened again, the sampler bob is reeled in, reclaiming the tape guard from the gate valve, until the bob hits the safety bumper in the sampler housing. The 4-in. gate valve is then closed—the door to the sampler chamber opened—the temperature recorded, and the contents of the sampler bob drained into the container through a valve in the bottom of the sampler, or returned to the tank.

Security Engineering Co. Back in Market With Securaloy

Release by War Production Board of a limited amount of aluminum alloy for oil-drilling purposes has brought Security Engineering Co., Inc., of Whittier, Calif., Houston, Tex., and Centralia, Ill., back into the market with Securaloy, patented drillable metal for well development and completions.

Thus for the first time since the freezing of aluminum stocks in early 1942 the California company will be able to furnish Securaloy for the many subsurface applications for which it has proved so successful. Among them:

1. Drillable windows providing efficient development of secondary zones and easy sidetracking operations.
2. Drillable-pipe and steel-pipe sections combined to form a production string.
3. Selective gun perforating of cemented liners.
4. Wide use of drillable liners in exploratory work.
5. Use of drillable scabbing sleeves in repair work.

With a view to supplying operators with drillable tubing for the stepped-up completions scheduled for 1944, the company is at present establishing new offices in Casper, Wyo., where Jim Campbell, formerly with Baroid and American Pipe & Supply, will be in charge; and at Odessa, Tex., where Russell Smith will be transferred from the Ventura, Calif., office of the firm.

The company is also enlarging its valve department for service to producers and refiners, under direction of C. F. (Cy) Johnson.

New Hydraulic Puller

The Simplex Jenny center-hole hydraulic puller, recently introduced by Templeton, Kenly & Co., was designed to accomplish in minutes pro-

duction, maintenance and repair jobs which normally require hours.

The Simplex Jenny pulls, pushes or lifts; and can also be readily rigged up as a portable press. This self-contained unit operates vertically or horizontally without the need for heavy auxiliary equipment, and without side thrust or friction. The Jenny is its own back-up and is self-supporting because of its center-hole construction.

Five models are available, of 30 to 100 tons capacity. Three models have single pumps and two have high and low-speed pumps which may be operated separately, alternately or together. Alloy steel rods are recommended as the Simplex Jenny will stretch, collapse or pull apart any mild steel rod that will fit through the center hole. The unit is built of heat-treated alloy steels to withstand heavy loads and service abuse. Each Jenny is tested before shipment for 50 per cent overload.

Trade Literature

Oakite Products, Inc., 22 Thames Street, New York, N. Y.—A 16-page Power Plant Digest which outlines 65 jobs that reveal cleaning and affiliated procedures that assist in prolonging the life of essential equipment. The digest is prepared in data form and is indexed.

Chain Belt Co., Milwaukee, Wis.—A 20-page catalog descriptive of Rex speed prime pumps for use in oil fields. In the catalog is complete information on the mechanical parts of

the pump, how it operates, and what it will do. Also included are specifications and capacity charts to aid in pump selection.

Midwest Piping & Supply Co., Inc. Bulletin 43-A, "A Simplified Method for Calculation of Pipe Wall Thickness." This new bulletin supersedes the one of the same name that was published in 1937. Since that time there has become available much more definite and authentic data as to the effect of high temperatures on the physical properties of the ferrous and alloy piping materials.

Among Equipment Men

Dayton Rubber Names Four Vice Presidents

Dayton Rubber Manufacturing Co., Dayton, Ohio, announces the appointment of T. C. Davis, formerly manager of industrial sales, as vice president in charge of mechanical sales planning and experimental sales. T. D. Slingman, New York district manager, has been made vice president in charge of mechanical sales.

T. C. DAVIS

T. D. SLINGMAN

In the manufacturing and development divisions of the company, H. S. Mooradian, superintendent, has been appointed vice president in charge of production, and Joseph Rockoff, chief chemist, has been made vice president in charge of development.

I. Eisbrouch will continue in the present capacity as vice president in charge of tire sales.

Hanlon-Waters, Inc., Elects Three New Board Members

M. F. Waters, president of Hanlon-Waters, Inc., Tulsa, announced that at the annual meeting of the company held at Tulsa, February 22, that Edward F. Deacon, president of Climax Engineering Co., Clinton, Iowa, and The McAlear Manufacturing Co., Chicago; Owen L. Coon, chairman of the board of General Finance Corp., Chicago, and James E. Allison, attorney for the Hanlon interests, were elected to the board of directors of Hanlon-Waters, Inc.

The old officers of the company, consisting of E. I. Hanlon, chairman of the board of directors; M. F. Waters, president, and J. H. Boyle, treasurer, were reelected. J. E. Allison, attorney for the Hanlon Companies, was elected secretary. L. J. Griffey, who has been chief engineer of Hanlon-Waters, Inc., for 10 years, was made vice president, and C. W. Snyder was appointed chief engineer.

E. I. Hanlon is chairman of the board of National Bank of Tulsa and is a prominent figure in the oil industry.

Hanlon-Waters, Inc., manufactures automatic control equipment for use in the oil field, together with oil and gas separators and bolted tanks. Climax Engineering Co., manufactures gas and diesel engines, power units and generating sets. The McAlear Manufacturing Co. manufactures automatic control equipment for the industrial steam power plant field.

The enlarged board of Hanlon-Waters, Inc., will make possible the close association of the three companies in the post-war period.

Weco Appoints New Officers And Designing Engineer

C. K. STILLWAGON

At its ninth annual board of directors meeting held recently in Houston, Tex., Well Equipment Manufacturing Corp. reelected C. K. Stillwagon as president and general manager S. H. Smith as vice president. H. J. Hagn, former secretary-treasurer, was elected vice president, and

S. H. SMITH

H. J. HAGN

J. H. Robinson was elected secretary-treasurer.

S. H. Smith, who has been associated with the company since its organization, has been granted a leave of absence to serve as a member of the U. S. Army.

The company also announces the employment of Gordon C. Hill as designing engineer. He was formerly employed by Kelley Manufacturing Corp. of Houston in the same capacity.

J. H. ROBINSON

GORDON C. HILL

Wilson Named Timken's Chief Metallurgical Engineer

Ralph L. Wilson, former Chief of the Constructural Steels Section of the Metallurgical and Conservation Branch, Steel Division, of the War Production Board in Washington, D. C., became chief metallurgical engineer of Timken Roller Bearing Co., Canton, Ohio, January 1.

Wilson is a graduate of Lehigh University where he received the degree of electrometallurgist.

His experience includes 6 years with the metallurgical departments of United Alloy Steel Corp. and Central Alloy Steel Corp., after which he was for 10 years employed by the Steel and Tube Division of Timken Roller Bearing Co. as metallurgical engineer, specializing in alloy steel tubing applications in the various process industries.

Zak Heads Tubular Sales For Pittsburgh Steel Co.

Carl L. Zak has been made manager of tubular sales for Pittsburgh Steel Co., Pittsburgh, Pa. Zak has been secretary of the Seamless Steel Tube Institute, Pittsburgh, since 1941; was with Youngstown Sheet & Tube Co., Youngstown, Ohio, for several years in sales capacities concerned with seamless and welded tubes and pipe, and earlier was with Globe Steel Tubes Co., Milwaukee, Wis., in sales-engineering work, inspection, and mill scheduling.

Lewis Joins Frick-Reid

T. L. Lewis, who had had wide experience in the equipment-supply field, has joined Frick-Reid Supply Corp., Tulsa, and has been appointed district manager of tube sales. His headquarters are in Houston, Tex.

Gilmour to South America For Cardwell

Bob Gilmour, vice president of Cardwell Manufacturing Co., Wichita, Kans., has left the United States for South America. His itinerary will include every oil-producing country in South America, and every major oil field. His wide knowledge of the oil industry and production problems has made him a welcome figure to any group of production men. He will carry complete information on many new developments of "Cardwell" drilling and servicing equipment.

N.A.M. Reelects Trout

At its annual meeting in New York City, the National Association of Manufacturers reelected W. C. Trout regional vice president. Trout is president of Lufkin Foundry & Machine Co., Lufkin, Tex., peacetime manufacturer of oil-well pumping units, now engaged in production of war goods. He has been prominently engaged in the activities of the National and State Manufacturers Associations, having served as president of the state association for three successive terms, 1 year as chairman of the board, and is now serving as chairman of the executive committee.

Smith Purchases Interest in Hake Galvanizing Co.

E. M. Smith, founder and for many years president of Emsco Derrick & Equipment Co. and various other Emsco organizations, announces the purchase of a half interest in Hake Galvanizing Co. of Harvey (near New Orleans), La., and his return to active participation in the industrial affairs of the Mid-Continent area.

For several years Smith was active in Globe Oil Tools Co. of Los Nietos, Calif., one of the organizations closely affiliated with the oil industry.

Hake Galvanizing Co. is engaged exclusively in war work at the present time, but will be available for oil-field and general industrial work as soon as war requirements have been taken care of. The company's operations extend throughout the Mid-Continent, Texas, Gulf Coast, and South Atlantic coastal areas.

Hasper With Continental Motors Corp.

Gerrit C. Hasper, having received an honorable discharge from the U. S. Army, has joined the Oil Field Sales Division of Continental Motors Corp., with offices at the Muskegon, Mich., plant.

MacLachlan Manager of H. K. Porter New York Office

MacLACHLAN

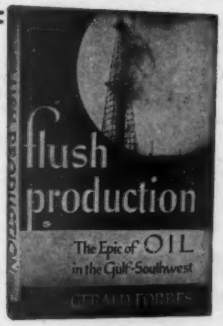
Opening of an enlarged New York and export office at 50 Church Street, New York, N. Y., has been announced by H. K. Porter Co., Inc., Pittsburgh, Pa.

The new office will serve as an eastern center for the company's entire line of locomotives, process equipment and pumps.

Thomas MacLachlan has been named general manager in charge, and is also directly handling locomo-

. . . . The Epic of Oil in the Gulf-Southwest

by GERALD FORBES



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A vigorous, readable history of oil in Oklahoma, Kansas, Texas, Louisiana, Arkansas, and New Mexico, where more oil has been produced than in the whole world outside of the United States $2.75

"It's recommended reading."—Claude V. Barrow, Oil Editor of *The Daily Oklahoman*.

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The Oil and Gas Journal, Tulsa, Oklahoma

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COLMONOY

Hard Surfacing Alloys and Overlay Metals

tive sales and service for the entire eastern seaboard. MacLachlan was formerly New York manager of Vulcan Iron Works of Wilkes Barre, Pa.

R. G. Newell, who managed the New York office of Quimby Pump Co. before its acquisition by Porter, is directing activities of Porter's Quimby Pump Division in New England and the New York district, from the new office. Earl M. Bardo, formerly with Robinson Manufacturing Co., is headquartered in the same office, representing Porter chemical process equipment for the same territory. The company's export department also has been housed at the 50 Church Street address.

Classified Advertising

The Market Place for the Oil Industry

UNDISPLAYED RATE

6 CENTS A WORD, minimum charge $2 per insertion.

SITUATIONS WANTED, 4 cents a word, minimum charge $1.

BOX NUMBERS, count 9 words when replies are to be sent to our Tulsa Office.

10% DISCOUNT if 3 insertions are ordered at one time, with check accompanying order.

All classified advertising payable in advance.

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1 inch	13 times	6.50
1 inch	26 times	6.00
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Rates are governed by total space used within 12 months from date of first insertion. Credits are allowed when lower rates are earned.

FORMS CLOSE 5:00 A.M. MONDAY
Published Each Thursday

EXPLORATION

GRAVITY Meter Party available about April 15, 1944. Seismograph Party about July 15, 1944. Box C-178, The Oil and Gas Journal, Tulsa, Okla.

ROYALTIES

OIL AND GAS ROYALTIES for sale in Western Kentucky Coal Basin. Now leased to large producing company. For prices and particulars, write Box C-167, The Oil and Gas Journal, Tulsa, Okla.

MONEY RAISING

CASH for stripper wells Centralia vicinity. Mike Liles, Jackson, Tennessee.

WANTED

WANTED

GAS RECYCLING PROJECT

By large independent having available new, complete compression equipment capable of handling large volume and high pressures. Interested in high pressure wet gas area, good gasoline content, good reserves, sufficient wells already drilled for a recycling operation. Prefer project with gasoline extraction plant already operating but with limited market for residue dry gas. Give all information possible first letter. P.O. Box 1914, Fort Worth, Texas.

FINANCING

CAPITAL SEEKERS — Interested in raising $25,000 or more for a legitimate project should write to AMSTER LEONARD, Fox Theater Bldg., Detroit 1, Mich.

CAPITAL inexpensively raised. Write for our proposition today. No charge for consultation. Address: Service P.O. Box 165, Chicago 90, Ill.

LEASES AND DRILLING BLOCK

2,000-ACRE lease in proven field in Rocky Mountain District; drillers attention; immediate drilling wanted. V. D. Tidball, Faith, S. D.

FOR SALE: Oil and gas leases and small production, located in Southwestern Kentucky, near drilling and producing wells. W. P. Harley, Bowling Green, Ky.

LEASES ROYALTIES

PRODUCING OR NONPRODUCING

Texas, New Mexico, Oklahoma

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20 Years' Experience

Inquiries Invited.

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60 Broadway Drive, Clayton
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LEGAL BLANKS

THE BURKHART LINE of Legal Blanks Since 1908. Oil-Gas and Business Forms for Mid-Cont. and Illinois Basin. Leases Rev with Gov.'s Regulations. Catalog and Samples. Burkhart Ptg. & Sta. Co., 115 So. Cincinnati. Tulsa. Okla

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6 month sub. $6.00
C. W. Deming—Publisher
Waycross, Georgia
20 years operating out of Tulsa.

LEASES AND DRILLING BLOCKS

DEEP drilling, new fields, 2,094 wells producing. Montana oil fields face action, 1944! Keep in touch! Free trial subscription! Montana Oil Journal, Elks building, Great Falls, Mont.

NEW MEXICO
STATE OIL AND GAS LEASES
Humble Oil & Refining Co., now drilling a scheduled 7,500 foot test. Other major oil companies own lease blocks near test. I offer 40 acres and multiples thereof in same area. Write for information. HARRY S. WRIGHT, New Mexico State Lessee, Farmington, New Mexico.

LUBBOCK County Lease for sale. W½, Sc. 43, Bl. P. offsetting location made in NW¼ Sc. 44, Bl. P. for new oil test NW Lubbock County. C. L. Craig, Perryton, Texas.

KARNES COUNTY, TEXAS — For Sale: 2,500 acres checkerboard leases across county. Six new fields discovered in this county in 1944. Ed Houlihan, Box 444, Beeville, Texas.

WYOMING AND MONTANA, the next big oil fields. Have blocks on big structures, will drill. You can get in ground floor today. Wire or write. P.O. Box 372. Denver, Colo.

A WORTHWHILE OPPORTUNITY

We own properties in California, Illinois, Indiana, Kansas, Louisiana, Nebraska, Oklahoma, Texas.

All of our properties have been broadly classified for oil possibilities by DeGolyer and MacNaughton of Dallas, Texas. This outstanding firm of geologists have selected from our total holdings certain properties, comprising more than 50,000 acres, as immediately suitable for oil and gas prospecting.

We invite inquiry from responsible drillers. We also have considerable acreage which we will consider leasing. Address P. O. Box 177, Cincinnati, Ohio.

Classified Advertising

PATENT ATTORNEYS

PATENTS, Trade-Marks, Booklet, "General Information Concerning Inventions and Patents" and "Free Schedule" sent without obligation. Established 1915. Lancaster, Allwine & Rommel, Suite 418, Bowen Bldg. Washington, D. C.

SITUATIONS WANTED

CORPORATION LAWYER, middle age, 20 years experience in Legal Departments of major and independent companies. Thoroughly familiar with oil and gas law and titles in the Mid-Continent States. Now employed eight years in Legal Department of major company. Desires change solely for personal reasons. Over draft age, in good health, married, one child. Available after reasonable notice. Would require salary around $6,000. Box C-168, The Oil and Gas Journal, Tulsa, Okla.

GRADUATE Geologist, recently graduated from Lafayette College, Easton, Pa., no field experience, but willing to work hard and go anywhere in continental N. A. In perfect health, age 26, and draft deferred. Can furnish a certificate of availability and excellent references. Richard W. Harding, River Road, Yardley, Pa.

FOR oil drilling locating we use the Multiple Gravitation Insulation Geology Block System. A positive method. We can locate oil pools from airplane. Draper & Co., Seymour, Iowa, Route 1.

TAX expert desires change. College education, age 39, certificate available. 18 years experience, 10 years with present employer, major oil company. Would leave Tulsa. Box C-173, The Oil and Gas Journal, Tulsa, Okla.

YOUNG MAN, 35, married, 2 children, University trained, over fifteen years experience in natural gasoline and recycling plant operations, desires situation with progressive organization. Has had broad experience in laboratory, close fractionation, plant operation, plant control, process design, construction, and organization work. Has working command of Spanish, both written and spoken. At present is superintendent in charge of one of the larger plants in the southwest. Certificate of availability can be obtained upon reasonable notice to present employers. Box C-175, The Oil and Gas Journal, Tulsa, Okla.

NEED new blood in your refinery? Have 18 years experience in general refinery work, primarily cracking. Last seven years in supervisory position. Now employed. Would like to contact growing independent with good postwar opportunities. Box C-174, The Oil and Gas Journal, Tulsa, Okla

SEISMOGRAPH COMPUTER: 6 years geophysical experience, including 3 years computing. B.S. Degree. Military classification 3-A. Leaving present employ March 15th for personal reasons. Would be available for future foreign work. Box C-187, The Oil and Gas Journal, Tulsa, Okla.

CERTIFIED PUBLIC ACCOUNTANT Age 48, married, with seventeen years public accounting experience in making examinations, cost and accounting system installations, tax practice and recently services arising by reason of the war, desires permanent position with postwar possibilities. Box C-185, The Oil and Gas Journal, Tulsa, Okla.

OIL FIELD Gager or Refinery Treater. Bix C-188, The Oil and Gas Journal, Tulsa, Okla.

PRODUCTION MAN: Cable tool and rotary drilling experience 22 years. Age 42. Available April 1st. Box C-181, The Oil and Gas Journal, Tulsa, Okla.

HELP WANTED

WANTED: Combination Dubbs Topping Plant operators; Combination power plant boiler operators; Pumpers; Still helpers, combination topping and cracking; Refinery Pump Mechanic, and refinery machinist. Location, inland Texas independent refinery. Box C-155, The Oil and Gas Journal, Tulsa, Okla.

HELP WANTED

CHEMICAL ENGINEERS with experience in any of the following petroleum refining operations (1) light ends recovery equipment, absorbers, stabilizers, etc. (2) catalytic cracking equipment or (3) crude distillation equipment and similar processing units. State in detail educational background, positions held with detailed explanation of work handled, age, and number dependents also draft status. Box C-165, The Oil and Gas Journal, Tulsa, Okla.

PIPE-LINE PUMP STATION ENGINEERS

Familiar with diesel type engines, for work in Oklahoma. 48-hour week. Major oil pipeline company. State qualifications, draft status, age, and salary desired. Box C-123, The Oil and Gas Journal, Tulsa, Okla.

OIL REFINERY
INSTRUMENT ENGINEER

Who is thoroughly experienced on selecting and specifying instruments.

FURNACE DESIGNER

experienced on oil refinery work.

5½-day week with time and one-half for work in excess of 40 hours per week. Apply at once, giving complete details including hourly rate desired. Statement of Availability required.

ARTHUR G. McKEE & COMPANY
2300 Chester Avenue
Cleveland, Ohio

WANTED: Chemist familiar with manufacture of White Oils and Sulphonates. Give age, experience, references, salary expected, draft status and when available. Box C-153, The Oil and Gas Journal, Tulsa, Okla.

WANTED, by a leading steel manufacturer; experienced field engineer for oil country tubular goods work; also want experienced man for sales and sales engineering work on seamless and welded mechanical and pressure tubing; Attractive opportunities. Write in full to Box C-160, The Oil and Gas Journal, Tulsa, Okla.

HIGH-CLASS business man with oil experience to make contacts with companies who may desire highly meritorious oil investments proposed by well established and responsible oil producers. State age, qualifications, experience, general commercial acquaintance and associations. References and salary. P.O. Box 1805, Fort Worth, Texas.

GOOD SALARY advancement and permanent position for capable experienced, ambitious man, thoroughly experienced in land department of oil business, office and field, and who can properly present meritorious drilling blocks and act as assistant to official of large oil company. State fully record of experience, references. Unusual opening for good loyal man. P. O. Box 1914, Fort Worth, Texas.

MECHANICAL ENGINEER: Experienced in centrifugal pump designing. Manufacturer of centrifugal pumps located in Central Indiana. Now doing essential war work but making plans for postwar which includes redesigning entire line. Company has 40 years reputation and bright future. Good opportunity for man with experience in this line. Give full information. Strictly confidential. Box C-180, The Oil and Gas Journal, Tulsa, Okla.

Wanted by Major Pipe Line Company

CIVIL ENGINEER, an excellent opening for an engineer capable of doing part-time drafting in headquarters office and survey work in the field. MECHANICAL ENGINEER, a permanent position as supervisor of mechanical maintenance and installation. Pipe-line experience required. Headquarters Tulsa. State qualification, draft status, age, and salary desired. Box C-122, The Oil and Gas Journal, Tulsa, Okla.

HELP WANTED

REFINERY SUPERINTENDENT

Experienced in both operations and maintenance. Graduate engineer 35 to 50 years of age who has a good record as a practical operating man, administrator and handler of men. Successful independent oil company with completely integrated operations located in Ohio valley. Reply Box C-186, The Oil and Gas Journal, Tulsa, Okla.

PRODUCTION CONTROL ENGINEER

Experienced in machine and welding shop, planning and routing jobs. Progressive Eastern manufacturer of heat exchange equipment and pressure vessels offers opportunity in war and postwar work. Write complete experience, current and former employers, salaries. Box C-182, The Oil and Gas Journal, Tulsa, Okla.

• • • • WANTED • • • •

Major oil company with continent-wide operations and research seeks graduate technical men of the following qualifications:

MECHANICAL ENGINEERS—with petroleum refinery or similar experience. Should be familiar with refinery design, estimating, construction, mechanical equipment, engineering materials, and utilities systems. Process knowledge desired although not essential.

CHEMISTS AND CHEMICAL ENGINEERS interested in research, design, or plant operation. Should have training and experience in refinery or other industrial organizations.

Work not of a temporary nature. In reply state experience, education, age, marital status, draft classification and salary expected, include small snapshot (not returnable). Replies strictly confidential. Applicants now employed at highest skill in war industries not solicited. Box B-670. The Oil and Gas Journal, Tulsa, Okla.

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PROCESS ENGINEER

Two Process Engineers, also two Junior Process Engineers. Must have chemical, mechanical or petroleum engineering degree. W.M.C. Certificate necessary. Write Associated Refineries, Inc., Box 831, Duncan, Oklahoma.

CRUDE-OIL PRICES

Representative selected crude prices from all sections of the country appear below:

East Texas	$1.26
Conroe	1.43
Tepetate, Louisiana	1.18
Illinois basin	1.37
Pecos County, Texas	.98
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas*	1.08

*No change since 5-21-41.

Gravity Schedules

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Texas	West Texas*
18-18.9	$0.80	....	....	....
19-19.9	.84	....	$1.06	$0.70
20-20.9	.88	$0.85	1.08	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9	....	1.07	1.30	.94
32-32.9	....	1.09	1.32	.96
33-33.9	....	1.11	1.34	.98
34-34.9	....	1.13	1.36	1.00
35-35.9	....	1.15	1.38	1.02
36-36.9	....	1.17	1.40	1.04
37-37.9	....	1.19	1.42	1.06
38-38.9	....	1.21	1.44	1.08
39-39.9	....	1.23	1.46	1.10
40 and above	....	1.25	1.48	1.12

*Includes Lea County, New Mexico.

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American Manganese Steel Div. 99
American Meter Company 22
American Roller Bearing Co. 101
American Steel & Wire Company 9
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Journalisms:

AN article with a formidable-sounding title, scheduled for early publication in the Engineering and Operating Section, should be of especial interest to geologists and petroleum engineers. The article, "Geometrical Orientation of Cores," presents a new method for determination of direction of dips of subsurface formations, which depends upon the geometric properties of deviated cores. Briefly, two cores are required to be taken in the formation whose dip is to be determined. Then, by a series of steps by which the cores are oriented, by placing the core axes in the direction and inclination determined for each by the well-survey or single-shot determination, and by recalling some of your high-school geometry, you arrive at the answer. It sounds complicated here, but the author breaks it all up into small pieces, so that even the nongeological reader will be able to get a working knowledge of the idea. The article is illustrated with views of the instruments, and with diagrams and charts.

MYSTERY of the disappearing soap chips is solved. The common ordinary household variety of soap flakes, 45,000 tons of them a year, will go into the production of synthetic rubber. For the mathematically minded, R. E. Bitter, technical service engineer, Hycar Chemical Co. has figured out that this amount of suds is equivalent to 160,000,000 standard size cakes of soap. Modifiers, such as carbon tetrachloride, are the real and continuing secret of superior quality in this nation's synthetic rubber. So don't be too critical of the chap who wears gravy stains on his vest these days.

CALENDAR

March

AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS, SOCIETY OF EXPLORATION GEOPHYSICISTS, AND SOCIETY OF ECONOMIC PALEONTOLOGISTS AND MINERALOGISTS, annual meeting, Dallas, Tex., March 21-23.

WESTERN PETROLEUM REFINERS ASSOCIATION, thirty-second annual meeting, Jefferson Hotel, St. Louis, Mo., March 28.

PACIFIC COAST DISTRICT, AMERICAN PETROLEUM INSTITUTE'S DIVISION OF PRODUCTION, spring meeting, Biltmore Hotel, Los Angeles, Calif., March 23.

April

NATIONAL ASSOCIATION OF CORROSION ENGINEERS, annual meeting, Rice Hotel, Houston, Tex., April 10, 11 and 12.

NATIONAL GASOLINE ASSOCIATION OF AMERICA, annual meeting, Baker Hotel, Dallas, Tex., April 12-14.

NATIONAL PETROLEUM ASSOCIATION, semiannual meeting, Hotel Cleveland, Cleveland, Ohio, April 20-21.

NATIONAL OIL SCOUTS AND LANDMEN'S ASSOCIATION, annual meeting, Dallas, Tex., April 24-25.

INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, midyear directors meeting, Bradford, Pa., April 27, 28 and 29.

May

SEVENTEENTH NATIONAL OIL AND GAS POWER CONFERENCE, sponsored by the Oil and Gas Power Division, American Society of Mechanical Engineers, Tulsa, May 8-10.

NATURAL GAS DEPARTMENT, AMERICAN GAS ASSOCIATION, spring conference, French Lick Springs Hotel, French Lick, Ind., May 11-13.

MID-CONTINENT SECTION, AMERICAN PETROLEUM INSTITUTE, annual meeting, Mayo Hotel, Tulsa, May 25-26.

June

AMERICAN SOCIETY FOR TESTING MATERIALS, forty-seventh annual meeting, Waldorf-Astoria Hotel, New York, June 26-30.

November

AMERICAN PETROLEUM INSTITUTE, annual meeting, Stevens Hotel, Chicago, November 13-16.